



Spool Manager/400 Product Information

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Preface

This document contains a general discussion of Cosyn Spool Manager/400 and its application at iSeries / AS/400 sites. A detailed User Guide is also available in Adobe PDF format.

All Spool Manager /400 displays contain full screen and context sensitive Help available by pressing F1 or Help.

System requirements

Cosyn Spool Manager/400 requires OS/400 V4R2M0 or later. Versions for earlier OS/400 releases from V3R2 upwards can be shipped on request.

Storage requirements, base system install: allow 12 Mb

Other Cosyn products

Spool Manager/400 works with and is complemented by our other products. These include:

Audit Trail/400 — Dynamic, Application Independent Audit Tracking of DB2 UDB/400 Field Level Changes. Schedule Audit Trail reports and use Spool Manager/400 to manage them.

Powerpage/400 — Paging/SMS + Operations Automation for IBM AS/400 and iSeries. Spool Manager/400 action entries can be set up to use Powerpage/400 commands if installed.

Create!forms International Products — Comprehensive range of quality downstream forms management solution including Create!form, Create!archive and Create!stream. Use Spool Manager/400 to manage hostside attribute changes and routing to Create! queues.

BCD Products — Award winning products from BCD Software including ProGen WebSmart, Catapult and EZ-Pickin's

You can find more information about these automation solutions on our [website](#).

Acknowledgements

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What is Spool Manager/400?

Cosyn Spool Manager/400 is a set of powerful iSeries and AS/400 spool automation and management tools for use by I/T Operations and Development personnel. Spool Manager/400 works as a central control point, repository and agent for capturing, storing and performing repetitive spool management tasks independent from the applications that create them.

Spool Manager/400 is tightly focused on managing spool files within the AS/400 host environment. There are two main aspects. The first is a [real time manager](#) that controls spoolers as they appear on output queues. Secondly, Spool Manager/400 contains tools for [downstream bulk spool file management](#) which assist you to manage spoolers accumulated on output queues.

Spool Manager/400 allows you to treat spool handling as a separate task area independent from applications that create the spool files. It addresses two main aspects of spool management- real-time control of spoolers as they arrive on output queues, and downstream bulk printing and purging of files left on the system.

The problem

Spool Manager/400 is a 'missing link' automated spooler management solution for AS/400 installations. It addresses the following common problems.

- AS/400 I/T staff and end users tend to spend several hours every week performing repetitive spool file management tasks. These tasks include responding to user queries about the location and status of their output, moving spool files to other output queues for printing or archiving, deleting unwanted ones, holding or releasing others.
- Along the way they might be required to change several attributes, for example the number of copies or form type.
- This open-ended cycle repeats itself regularly; staff tend to become swamped by what is essentially a trivial and error prone task and have less time for more important activities.
- Keeping the spoolers tidy and procedures manual up-to-date rapidly becomes a nightmare.
- Keeping unwanted spool files for longer than necessary consumes operating system resources. All job details are retained in the system task table until the job's associated spool files are removed from the system.
- Service levels are lower than they could be due to the potential time lag between the creation of the spooler and its final destination.
- When a spooler's attributes or target output queue need changing regularly a programmer is usually brought in to make changes to the application code, using up development time that could be better applied elsewhere.
- Re-applying program modifications related to print management can significantly complicate upgrading to new releases of package software.
- Often such application changes are hard-coded in order to quickly tackle the short-term problem, i.e. pushing spoolers out to the right output queues with the right attributes. This tends to move the problem somewhere else because as time goes by applications, output queue and printer configurations change. More and more code has to be modified to maintain the same level of spooler control.
- Often enterprise application software design anticipates end users having some degree of knowledge and control over where their output goes. This requires continuous training effort as new users enter the organization and despite this the end result can be errors.

Spool Manager/400 allows you to keep efficient, central, fast and easy control, minimize errors and reduce ongoing programming and training effort to a bare minimum.

The solution

Spool Manager/400 provides I/T personnel with quick and complete external control of all spool file activity. It eliminates the need to manually manage spool files and make program modifications.

In addition Spool Manager/400 reduces the ongoing application parameter setup and maintenance effort needed. Many integrated ERP applications have basic spool control parametrization built in. Spool Manager/400 sites can configure application settings to simply send spoolers to very few output queues. Spool Manager/400 can then monitor these queues and perform the detailed runtime changes and redirection to printer queues. Since all spool control is centralized within the Spool Manager/400 database you no longer have to maintain user or workstation settings across several different applications, modules, regions and users.

We also identified a need for downstream bulk sorting and printing of archived spool files held across multiple output queues. A further requirement we wanted to address was the ability to automatically purge spool files left on the system once they had reached a predefined age.

We wanted to create tools that could be easily embedded within operational procedures like the IPL startup program and end-of-day runs, and also within the OS/400 scheduler. To that end we implemented a simple full-function command interface to access all Spool Manager/400 functions.

The final result was Spool Manager/400. We installed the first version in 1994 and it has been bringing major benefits to increasing numbers of AS/400 sites every day since then. We sincerely hope it will do the same for you.

How it's used

Typically in a busy AS/400 shop the Spool Manager/400 spool server process is started at IPL and runs continuously in the background. I/T personnel tell Spool Manager/400 which output queues to monitor and set up specific and 'catch-all' actions to perform on spoolers arriving on these queues.

Applications send spooled output to the monitored output queues. The monitored queues are not associated with printers. As spoolers arrive Spool Manager/400 searches through its database for your instructions on what actions to perform on the spooler, performs the specified activities and writes to a log file for diagnostic purposes.

'Catch all' entries in the spool action database take care of the majority of traffic. Approaches vary but usually you would configure Spool Manager/400 to move most files to a system printer or archive queue for review/print later. For exceptions to the general rule you set up explicit handling action entries.

Where users typically fall into natural groupings, e.g. by printer, geographical location etc, you can set up user groups. This allows you to set up a single handling entry common to all users in the group.

Typically you would set up Spool Manager/400 to move spoolers that you require to print immediately to printer-active output queues after changing any attributes like form type, number of copies etc. You can also tell Spool Manager/400 to delete immediately any spool files that you regard as junk. Spoolers that you don't want to print but do want to keep you would usually move to non-printer 'archive' output queues.

At end of day you can use the Spool Manager/400 downstream bulk handling processes, [Print Run](#) and [Purge Run](#). You would typically embed these commands within your end of day CL programs. Print Runs merge and sort spoolers from across several archival output queues and place the sorted output onto a printer queue for tidy printing and filing. Purge Runs allow you to automatically delete spoolers from archival queues once they have reached a certain age.

Benefits

Some of the major benefits of Spool Manager/400 are —

- No need for ongoing end–user training in and provision of access to spool handling commands WRKSPLF, WRKOUTQ etc
- No hard-coded modifications to programs' spool handling routines are required on an ongoing basis.
- Existing modifications can be removed and/or not re-applied when upgrading to new versions of your ERP software.
- All spooler real time control can be in one place
- Additional sophisticated real time processing can be brought into play easily
- Spool Manager/400 makes it easy to automatically copy spool data to database files for writing to mass offline storage media
- Application spooler output control parameters can typically be configured very simply, once only
- You can set up Spool Manager/400 to delete nuisance output automatically keeping the number of files and jobs on the system down
- Centralized logging allows quick diagnostics of all monitored spool activity
- Improved service levels result from quicker turnaround of change requests and reduction in ongoing program changes
- Automatic downstream processing of spoolers left on the system significantly reduces workload on IT staff and aids system performance
- Print Runs allow you to print spoolers from across several output queues in a tidy, sorted, continuous run for filing
- Once set up Spool Manager/400 is a 'hands-off' system that works smoothly in the background
- Spool Manager/400 real time monitor is 'event driven' and uses very little system resource
- Huge savings in paper use and personnel time. Good for the environment, good for staff morale, good for productivity, good for the bottom line

Functional overview

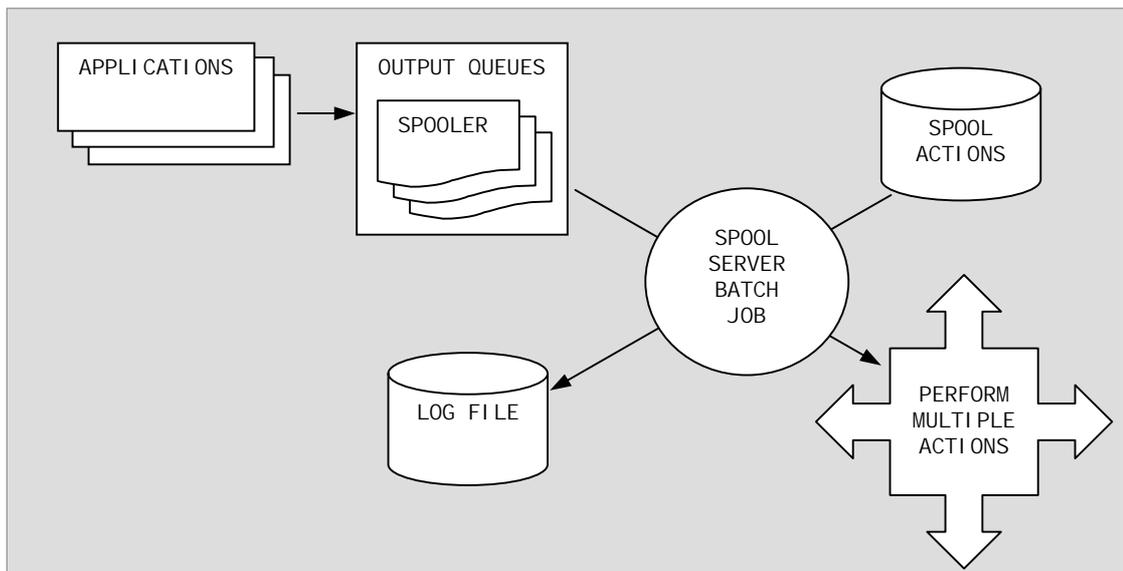
This topic describes the two general aspects of Spool Manager/400, its real time function and downstream functions.

Real time functions

The real time aspect of Spool Manager/400 is the Spool Server. This runs continuously and monitors the output queues you have specified. When spooler traffic arrives on one of the monitored queues the Spool Server determines what actions to perform by looking up the spool action database.

The Spool Server and Action Database

The diagram below illustrates what occurs when an application creates a spool file on an output queue that Spool Manager/400 is monitoring.



Actions — The quadruple arrow box above indicates the spool server can perform multiple actions on a spool file. You tell Spool Manager/400 in advance what to do and when it detects the spooler's arrival on a monitored output queue it applies your actions. You can change a spooler's attributes, delete it, duplicate it, copy it to a database file, call your own handling program, execute any OS/400 command or perform combinations of several actions. In addition sites using our companion product Powerpage/400 can send notification to pagers or cellular phones.

You can use Spool Manager/400 to control the redirection or duplication of particular spool files to a specialized output queue that can be polled efficiently by a client-side utility, for example the Create! range of products or BCD Software's Catapult. The client

application would pull down the spool files to a Windows server machine and transform and distribute via email in a number of commonly used formats.

Output queue monitoring — You can set up Spool Manager/400 to monitor one or many output queues for the arrival of spool files. These monitored queues are best left unassigned to a printer. They act as receptacles for Spool Manager/400 to monitor for the arrival of spool files and act upon them. Or to put it another way you can let Spool Manager/400 do all the moving of files to their respective printer output queues.

Spool Manager/400 Spool Server — When a spooler arrives on a monitored output queue the Spool Manager/400 spool server job (running in batch) detects the activity and looks through a database (which you define) to determine what to do with the spooler, if anything. If it finds an entry for the file in question the activity(s) you have specified are applied. If it finds no explicit action specified you can set up a default catch-all action, for example to move it to a system printer or holding output queue.

For example you might have set up an output queue called 'APPOUTQ' and told Spool Manager/400 to monitor it. You might also have set up an entry in Spool Manager/400's spool control database to catch spool files called 'APP100' and move them to a specific printer output queue. In addition you might want Spool Manager/400 to duplicate the spooler to an archive output queue, or copy the data out to a physical file for downloading to CDR

Anything you can do with a spool file on the AS/400 you can trigger from Spool Manager/400, including changing the number of copies, form type, save, hold, or delete it, change user data, duplicate it, copy it to a database file or PC document, etc.

You can also tell Spool Manager/400 to call user-defined break-out programs with which you can perform further detailed processing, for example warning an operator when a critical picking slip has been on an output queue for too long indicating the writer is offline. There are examples of advanced applications for user breakout programs in the Advanced Topics section of the User Guide.

Downstream, bulk handling functions

We designed two downstream functions to complement Spool Manager/400 real time handling. After the Spool Manager/400 Spool Server job running continuously in batch has directed the real time spool traffic, perhaps changing attributes and pushing files out to various holding output queues, the downstream bulk handling commands let you deal with the accumulated files in a meaningful and automated way.

Every site ends up with a lot of spoolers left over on the system. Typically you might retain these for two reasons. Firstly you may want to hold them for later bulk printing. Second, you may want to hold them on an output queue 'just in case' you need them again but generally speaking after a certain time period they are no longer useful and just consume system resources until someone gets around to manually deleting them.

You can set up two functions in Spool Manager/400 to assist you to manage these situations.

Print runs take spool files from one or many output queues and place them on another output queue in any sort sequence you require for printing.

Purge runs delete spool files on one or many output queues if they are older than your specified number of retention days.

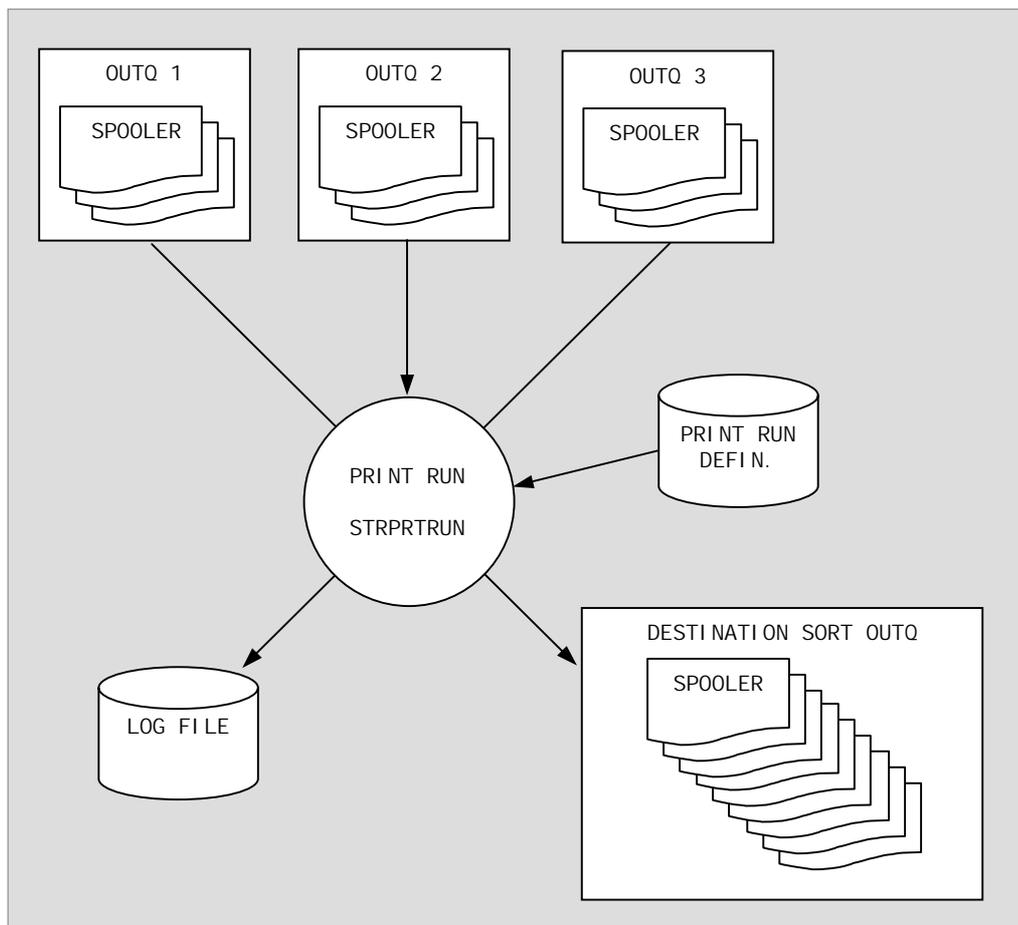
Purge and print runs are accessible via Spool Manager/400 commands STRPRTRUN (start print run) and STRPRGRUN (start purge run). Once you've set up the runs in Spool Manager/400 you can use these commands to invoke them from CL programs such as your nightly backup, the OS/400 job scheduler or wherever appropriate.

More details of these functions are overleaf.

Print Runs

The Spool Manager/400 print run functions allow you to define and store definitions you can use to move and sort archived files from multiple output queues onto a single destination queue. You specify the source output queues from which to take spool files and define a sort sequence. When you execute the print run via the **STRPRTRUN** command or menu option Spool Manager/400 transfers all the files from the nominated output queues to the destination output queue, usually for printing in the specified sequence.

This allows you to accumulate spoolers on the system and print them out later in a solid, logical sequence for archiving, rather than in a messy 'real time' heap of unsorted torn paper on the computer room floor. Simply use Spool Manager/400 to sort and load up a printer output queue, moving all the spoolers from the archive output queues. The following diagram illustrates the print run process.



Purge Runs

Purge runs are very useful for keeping files around for a while and then automatically deleting them when they reach a certain age. You define a purge run's control attributes and associate a set of output queues with it, specifying the maximum age for spoolers you wish to keep. When you execute the run via the STRPRGRUN command or menu option Spool Manager/400 looks at all the queues you nominated for the run, checks the age of the files and other attributes and deletes anything older than the number of days you specified.

Purge runs optionally write a detailed log of their activities to the purge run log for review afterwards.

If you set up your end of day run to include the Spool Manager/400 purge run command STRPRGRUN you will never again have to manually clean-up archive output queues.

FAQ (frequently asked questions)

Q: Why don't you recommend monitoring queues associated with active writers?

A: Because once the spooler starts printing Spool Manager/400 cannot apply any spool handling actions you've specified

OS/400 locks the spooler once it's started writing so Spool Manager/400 cannot do anything with it. It's better to ensure applications send their output to non-printer queues for Spool Manager/400 to monitor. Then you can be sure Spool Manager/400 will be able to perform any necessary attribute changes and other activities before rerouting them to other queues for printing or archival.

Q: In what sequence does the spool server search the database for spool control action entries?

A: From most explicit to most general

The action entries have three keys, spool file name, job name and user / user group. If you specify all three (exact, explicit match) it will look for that entry first. Likewise, if you specify none of them, i.e. all have a value of *ANY, this entry is a 'catch-all' and it will look for that entry last. You can find the exact order of the search sequence in the User Guide and Help text.

Q: What happens if I tell Spool Manager/400 to move a spooler to another queue that it is also monitoring?

A: Spool Manager/400 will see it again and look for more (or the same) spool handling entries to apply.

You naturally have to be careful not to get into a loop situation. For example don't set up entries that will move spoolers from queue 1 to queue 2, then back to queue 1, then back to queue 2, ad infinitum. Usually you would not move spoolers from one monitored queue to another monitored queue. Just monitor a few queues not associated with writers, configure your applications to send all output to them, and move spoolers from them to unmonitored queues after changing any required attributes.

Q: I don't want to have to set up spool handling for every single spooler on my system

A: You don't have to. Use a catch-all entry for the commonest file handling scenario, then set up explicit actions to handle the exceptions

Typically most spoolers don't require too much handling. Approaches differ but often you would either simply move them to PRT01 (or your most-used system printer output queue) and let them print, or perhaps move them to a non-printer queue. Another approach is to send them to a general queue for manual review and perhaps bulk

printing later. After you have set up a catch-all entry to do that you have catered for the majority of the spooler traffic. Now it's just a matter of setting up the exception handling, dealing with spoolers that are exceptions to the general rule.

Exceptions are by definition fewer in number so you shouldn't have to set up too many action entries to capture them all. With some initial analysis and planning you can set up your output queues in such a way that it's clear which files you can ignore and let the catch-all entry deal with and which ones need moving to special printers and/or have other actions performed on them.

We have found that most of the Spool Manager/400 setup tasks are complete within a week or so of installation. From that point on it's just a case of adding any new exception handling entries required for new spool files as they appear.

Q: How do Spool Manager/400 user groups relate to OS/400 user groups?

A: They don't. Spool Manager/400 user groups are independent from OS/400 user groups.

Spool Manager/400 user groups are unrelated to OS/400 user groups. Typically the purpose for which you would create OS/400 user groups is unrelated to spool file handling requirements.

OS/400 user groups are usually created to control access to system and objects. Spool Manager/400 user groups are used to define common spool file handling activities to be applied to related users, for example moving logical groups of users' spool files to a common printer.

The application in this case is completely different so our implementation of user groups is independent from OS/400's. Spool Manager/400 user groups are defined and stored within the Spool Manager/400 database and have no effect on the actual OS/400 user profile definition.

Q: Do I need to stop and restart the spool server if I make a change to the spool handling database?

A: No. The spool server will pick up your changes next time it uses the changed entry.

Q: How can I get Spool Manager/400 to send my spool data out to a database file for downloading to CD / microfiche etc?

A: Here are three ways: i) create a stored command, ii) call a local user-defined breakout program, or iii) use Spool Manager/400's inbuilt file archiving feature

i) Simple copy: If the destination database file will already exist at runtime and you simply want to write to it just create a single stored command to copy out the data.

▪ Take menu option to work with stored spool file commands.

- Press F6=Add and give the entry a name, e.g. CPYSPLF01.
 - Type a description e.g. 'Copy to download file MYFILE', type command CPYSPLF and press F4=Prompt.
 - Type 'X' for the spool file name to get it through the syntax checker, and set the required parameters TOFILE(*yourfilenamehere*) and MBROPT(*ADD), or (*REPLACE) if you want to overwrite it each time.
 - Now attach the stored command to the spool server action entry via menu option 3
- ii) Program: If you want to perform multi-step processing it might be better to create a user breakout program. You can derive it from the skeleton source code you will find in QSRCCSM, member ACTPGM. This skeleton source CL program has all the input parameters predefined for you. Copy the source member to your development library, add your handling commands and compile it. Then set up an action entry to call it by specifying *PGM under an additional action 'Type' column, and put your program's name in the 'Action' column.
- iii) Use Spool Manager/400's inbuilt file archiving feature. This allows you to specify 'file sets' to which to copy. Format can be any of the OS/400 CPYSPLF output types plus there is an option to create HTML with hypertext indexing. The User Guide contains full documentation.

Note — CPYSPLF has an additional parameter option for including control characters of various types. Set this as appropriate to the downstream usage, for example outsourcing bureaus might need this parameter set to *FCFC or *PRTCTL. The file archiving function additionally supports HTML output.

If your requirement involves saving spooled audit trails of changes made to files you might like to investigate our companion product Cosyn Audit Trail/400. This database file change tracking software can make paper trails unnecessary. Audit Trail/400 uses triggers to store the audit trail information in DB2 UDB/400 physical files.

Implementation

To get the most out of Spool Manager/400 it naturally pays to do a little planning and preparation. In summary we suggest the following steps:

- Review
- Set up spool handling entries
- Configure, test and cutover
- Implement bulk downstream purging / printing

The User Guide contains a full discussion of these topics to assist you during the implementation stage and Cosyn Software staff are always available to answer any questions you may have.

Contact

If you would like more information please contact Trevor Middleton at Cosyn Software trevorm@cosynsoftware.com cellular phone 025 724 405.

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