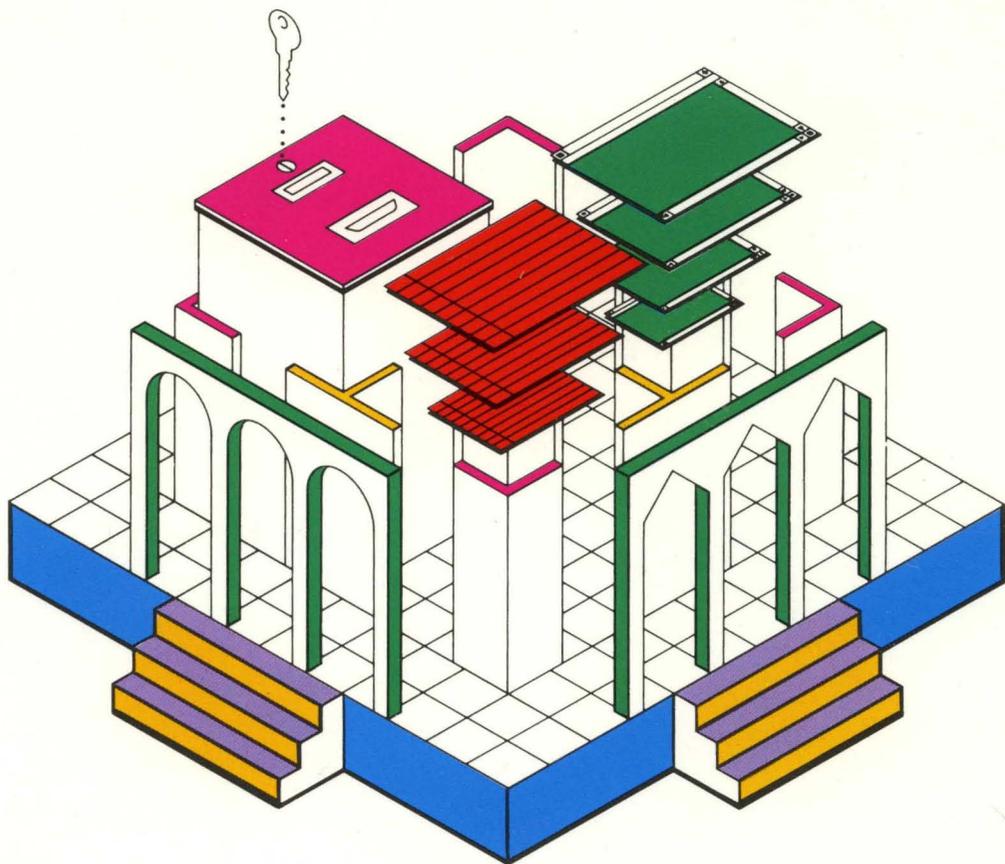# Concurrent™ DOS

Multiuser/Multitasking Operating System

Print Spooler User's Guide

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Concurrent™ DOS
Print Spooler User's Guide

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Using the Print Spooler

Introduction

Print Spooler allows multiple users to use one or more printers without printer ownership conflicts. Print Spooler is specifically written for Digital Research's Concurrent DOS operating system. To run the print spooler you will require Concurrent DOS XM version 6.2 or Concurrent DOS 386 version 3.0. The system must have a hard disk and at least 1 MB of free disk space.

On a multi-user computer system, usually only one user may use any printer at a time. Once a printer has been assigned to an application program, the printer can normally only be used by that application until the process is terminated or the application explicitly detaches from the printer. However, very few application programs explicitly detach from a printer once they have completed printing.

The print spooler avoids these problems by acting as a virtual printer. On a system where the print spooler is installed, all the printers are owned by the print spooler exclusively. When an application prints a file, the file is intercepted by the print spooler and redirected into a spool file. Once the application has completed printing, the spool file is closed and the despool module sends the contents of the spool file to the required printer.

The print spooler allows multiple spool files to be open at the same time, even if the files are to be printed at the same printer. Therefore, several applications can print to the same printer simultaneously.

The print spooler uses the following methods to detect that a print job is completed and close the spool files:

* The application performs an explicit printer detach command.

* The process is terminated.

* The application does not send any characters to the printer for a certain time, known as a time-out period.

The time-out method is used with most PCDOS applications running under Concurrent DOS, since PCDOS applications rarely inform the operating system when they have finished printing.

You can configure the print spooler for your particular environment, using configuration parameters specified in the CONFIG.CPL file.

Installing the Print Spooler

The print spooler must be installed using the installation utility on the master disk. To install the print spooler follow these steps:

1   Boot your system. Exit from any menu environments and return to the command line prompt, usually **C:\\>**

2   Insert your master disk into the floppy disk drive.

3   Type **A:** to log to the floppy disk.

4   Type:

        INSTALL

        The INSTALL utility copies the files SPLSVR.CMD, ESPL.CMD, CDSPL.CMD, and CSPOOL.CMD to the system directory (C:\CDOS). The file CONFIG.CPL is copied to the spool directory \CDOS\SPOOL. The installation program creates this directory if it does not already exist. Finally, **INSTALL** asks you to modify the AUTOEXEC.BAT file with the **SET** command.

5   Remove the master disk from the drive and store it in a safe place away from magnetic fields, heat, and other extreme environments.

7   Use the SET command to set the CSPOOL environment variable. To do this, include the following command in your AUTOEXEC.BAT file or the START file for the main console:

        SET CSPOOL=C:\CDOS\SPOOL

8   Reboot your system and type **SET** to check that the "CSPOOL=" entry is correct.

9   Type:

        CSPOOL

        When the installation is cpompleted successfully, you are given a help message with a list of available commands.

10   You may now start the spooler by typing

        CSPOOL START

Print Spooler Commands

Only one copy of the print spooler is required to provide print spooling for all users in a Concurrent DOS system. The print spooler provides a number of commands to manage the print jobs. These commands effect all users on the system, so you should take care not to disturb the work of other users if you use the commands.

Print spooler commands are issued in the following format.:

Command name [options]

The following commands are available:

START

Usage: CSPOOL START

START installs the spooler. The command should be included in the AUTOEXEC.BAT file, but it should only be executed from the main console. When Concurrent DOS runs the AUTOEXEC.BAT file the first parameter which it is passed is the console number on which it is executing. To run the START command from virtual console 1 you should include the following statement in the AUTOEXEC.BAT file:

IF " %1"=="1" CSPOOL START

Note: Make sure that your printer is turned on and that the paper is properly aligned before starting the print spooler. If any jobs are pending from a previous session the print spooler will start printing these as soon as it is installed.

QUIT

Usage: CSPOOL QUIT

QUIT removes the spooler from the system. You should always remove the spooler from the system before turning off the system. That way, any pending jobs are saved correctly and open files are closed.

STATUS

Usage: CSPOOL STATUS [C]

STATUS displays a list of jobs and their status. Jobs currently printing are shown as **Active**; Jobs waiting for a printer are shown as **Queued**. A maximum of four jobs can print simultaneously on four different printers.

CSPOOL STATUS

displays a single summary of job status

CSPOOL STATUS C

continuously updates the status display.

PRIORITY

Usage: CSPOOL PRIORITY job number value

PRIORITY allows the priority of a queued job to be changed. You must specify the Job number (shown as Job#, in the first column of the STATUS display) and the priority Value. The priority value is a number between 1 and 10 specifying the job's print priority. A low value causes a job to be printed before other jobs. A high value causes a job to be printed after other jobs. For example, to set the priority of job number 4 to 2, type:

CSPOOL PRIORITY 4 2

STOP

Usage: CSPOOL STOP [job number]

STOP deletes a print job from the active or queued list. If you type **CSPOOL STOP** without the job number, the status list of jobs is displayed followed by a prompt for the job number. Alternatively, the job number may be specified on the command line. For example, to delete job number 5 type:

CSPOOL STOP 5

Configuring the print spooler

The CONFIG.CPL file contains information needed to run the print spooler. You may need to edit the information to configure the print spooler for your particular environment.

You must edit CONFIG.CPL with an editor that allows NON-DOCUMENT mode. WordStar in NON-DOCUMENT mode or DREDIX, provided with Concurrent DOS, are suitable editors.

All entries are CASE sensitive. The keywords MUST be in upper case. Process names are usually in upper case, however, some processes may contain lower case characters, such as "Tmp".

The following entries in CONFIG.CPL may be edited:

TIME_OUT n

TIME_OUT is the time that needs to elapse without any characters being sent to the printer from an application, before the spooler closes the associated spool file and starts printing this job's data. n is a decimal value in seconds. A sensible value is 15 seconds. Some applications, for example Supercalc4, sending graphics to a printer, may pause for a long time between certain parts of a printout. If you notice that a particular job's printouts are split into several individual spool jobs, a higher TIME_OUT value is required.

FORMFEED n

FORMFEED specifies the ASCII character used to indicate that the printer is to advance to the top of the next page. n is the decimal representation of the ASCII character. For most printers the value is 12. If you do not wish the spooler to add a form-feed after it has finished printing a job enter the value 0 here.

NOFEED_JOBS {process list..} END_LIST

NOFEED_JOBS contains a list of processes which do not require a
form-feed. Several applications, such as WordStar®, SuperCalc®, and
Xerox® Ventura Publisher™, send a form-feed to the printer themselves.
The print spooler also sends a form-feed after completing the print job
unless the name of the application is in the NOFEED_JOBS list. To
avoid a blank page after the print-out add the job name to this list. The
name of the job is usually the primary file name. The list must be
terminated with the word END_LIST.

DEFAULT_PRIORITY n

DEFAULT_PRIORITY is the priority assigned to jobs not listed in the
JOB_PRIORITY list. When a new print job enters the spooler it is
assigned a priority. Jobs with higher priorities are printed ahead of jobs
with a lower priorities. 1 is the highest priority;10 is the lowest priority.
A suitable value for DEFAULT_PRIORITY is 5.

JOB_PRIORITY {process n list..} END_LIST

JOB_PRIORITY is a list of processes and the priorities to be assigned to
them. Each entry has the format: *process_name n*, where n is the priority
number between 1 and 10. A lower number represents a higher priority.

```
JOB_PRIORITY
WS 3
VP 2
SC 1
END_LIST
```

assigns priority 3 to the WS application, priority 2 to the VP application,
and priority 1 to the SC application. The list must be terminated with the
word END_LIST.

NOT_PRINTER {p#} END_LIST

NOT_PRINTER contains a list of printer numbers that are not used in the Concurrent DOS system but which have serial ports, that are used as auxiliary ports, associated with them. On most Concurrent DOS systems the serial ports may be used as printers or as auxiliary ports for modems, etc. The print spooler establishes ownership of all legal printer ports whose printer numbers are not in the NOT_PRINTER list.

You must create a NOT_PRINTER list if you want to use a program such as a modem communications program, which establishes auxiliary port ownership when it runs. For example, if COM1 and COM2 (AUX 0 and AUX 1) are to be used as modem ports, rather than as printers, you should list printer numbers 3 and 4, which correspond to the AUX 0 and AUX 1 serial ports, in the NOT_PRINTER list as follows:

   NOT_PRINTER 3 4 END_LIST

The list must be terminated with the word END_LIST.

CLEAR_SCREEN {d} 0

CLEAR_SCREEN specifies the escape sequence used to clear the screen. Entries must be in decimal. Normally this is set to 27 69, the sequence used by Concurrent DOS on the main console. The last entry in the list MUST BE 0.

HOME_CURSOR {d} 0

HOME_CURSOR specifies the escape sequence used to home the cursor. Entries must be in decimal. Normally this is set to 27 69, the sequence used by Concurrent DOS on the main console. The last entry in the list MUST BE 0.

These are the only user-definable options in the CONFIG.CPL file. All other entries are only for use by OEMS or Digital Research, Inc. Do not attempt to edit the other entries since it may cause unpredictable results.

Configuring PCDOS Applications for the print spooler

Native mode Concurrent DOS and CP/M-86 applications are specifically intended for multi-tasking and multi-user environments. These applications need no special configuration for use with the print spooler. PCDOS applications, however, often go to hardware directly, instead of allowing the operating system to manage these resources. To run PCDOS applications in this environment and with the print spooler, the applications must be configured to use system services, rather than hardware services to "talk" to the printers.

The ideal configuration for PCDOS applications is for the applications to use the PRN or LST device. However, most PCDOS applications use INT 17 calls on ports LPT1 and LPT2. These applications will work correctly with the print spooler but applications configured for the COM ports may produce unpredictable results.

If your application does not support PRN or LST devices, configure the application to use LPT1 or LPT2. If your system does not have a parallel printer (LPT1 and LPT2) you can still configure your application to use LPT1 or LPT2 and map the printer 0 or 1 respectively to printer 3 or 4 (the serial printers on a standard Concurrent DOS system).

If your PCDOS application does not print correctly with the spooler installed, check the configuration. If necessary request support from the application vendor on how to configure the application to use the PRN, LST, or LPT devices. If the application must be configured to use hardware directly the print spooler can not be used with that application. No such applications were encountered during the development of the print spooler.

Notes and Comments

Normally, you will not be aware of the spooler as most functions are managed internally. When you first use the spooler, or when moving new applications on to the system, make sure that time-outs and form-feeds are correct and adjust the CONFIG.CPL file if necessary.

A print spooler is not a printer buffer, so print jobs are not necessarily performed faster with the print spooler than without it. Usually, control of your application is returned to you sooner when the print spooler is installed. However, the time taken to complete the printing may be longer with the spooler installed. This is because the print spooler only starts printing when the application has finished sending characters to the printer. Thus there is a time-lag between the completion of a print job from the application's point of view and from the printer's point of view.

In an environment where regular print jobs are performed from multiple consoles the benefits of the spooler are very noticeable, since it is no longer necessary to ask other operators to exit their applications in order to free the printer.

The perceived performance of the spooler also depends on the type of printer being used. A dot matrix printer usually locks applications for extended periods. With the print spooler, however, control is returned to the application relatively fast. On the other hand, laser printers are likely to take a longer time to complete when the print spooler is installed. The large amount of data first needs to be spooled to the disk and then from the disk to the printer.

Since the spooler owns the printer as a resource, you cannot use the ^P command to attach the printer to the console. However, you may use command line redirection to print. For example, to send the directory to the printer, type:

DIR > PRN:

Precautions

As the spooler may have files open at any time after any print activity occurs on the system, you should terminate the spooler before switching off the system. This ensures that no open files are on the system. You may also reboot the system when all applications have been exited and all print jobs have completed. You should not switch off or reboot the system while the Concurrent DOS status line shows any open files (shown as drive letters).

Use the Concurrent DOS CHKDSK/F command regularly to convert any lost clusters created by switching off the system while there are open files. Be sure to make back ups before doing this. This applies to all systems, not only those running the print spooler.

Do not delete any files in the SPOOL directory while the print spooler is running. If you wish to delete files in the SPOOL directory you must first use the print spooler QUIT to terminate the spooler. You may then remove all .SPW, .SPR, and .SPL files. Also, do not attempt to access the files in the spool directory while the print spooler is active. This could produce unpredictable results.