Print Services Facility for OS/390 & z/OS

Introduction

Version 3, Release 3.0

G544-5625-03

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Note

Before using this information and the product it supports, be sure to read the general information in “Notices” on page 27.

Fourth Edition (March 2002)

This edition applies to the IBM® Print Services Facility™ Version 3 Release 3 Modification 0 for OS/390® licensed program, Program Number 5655-B17, and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters. Be sure to use the correct edition for the level of the product.

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About This Publication

This publication provides an overview of the Print Services Facility (PSF) Version 3 Release 3.0 for OS/390 licensed program (Program Number 5655-B17). This introduction includes an overview of PSF for OS/390 and its benefits; features and related products that are used with PSF; and how you can use PSF for OS/390.

PSF runs on OS/390 and z/OS™ systems. In this publication, the term ″OS/390″ refers to both systems, unless otherwise specified.

Who Should Read This Publication

This publication is intended for executives and technical personnel who need to understand the benefits and capabilities of PSF 3.3.0 for OS/390 or who want to evaluate using the Infoprint® Server Printer Inventory with PSF. You should read this publication if you are a new customer of Advanced Function Presentation™ (AFP™) printers or an existing user of PSF/MVS Version 2 Release 2.0, PSF Version 3 Release 1.0 for OS/390, or PSF Version 3 Release 2.0 for OS/390 who is looking to upgrade.

How This Publication Is Organized

This publication is organized into three chapters to help you obtain the information you need about PSF for OS/390:

- Chapter 1, “Overview of PSF for OS/390” on page 1 summarizes the relationship between AFP and PSF for OS/390, explains how PSF manages AFP printing, and describes the benefits of upgrading from PSF/MVS 2.2.0, PSF 3.1.0 for OS/390, or PSF 3.2.0 for OS/390 to PSF 3.3.0 for OS/390.
- Chapter 2, “Features and Related Products” on page 11 describes the features of PSF and the related products used with PSF for OS/390.
- Chapter 3, “Using PSF for OS/390” on page 19 presents several scenarios that show how PSF for OS/390 is used in various printing situations.

Related Information

Table 1 contains IBM publications that provide additional details about PSF for OS/390, its features, and related products:

Table 1. Related Publications

Title	Order Number
AFP Conversion and Indexing Facility: User's Guide	S544-5285
PSF for AIX: AFP Upload Configuration Guide Using TCP/IP	S544-5423
PSF for AIX: AFP Upload Configuration Guide Using SNA	S544-5422
PSF for OS/390 & z/OS: Customization	S544-5622
PSF for OS/390 & z/OS: Diagnosis	G544-5623
PSF for OS/390 & z/OS: Download for OS/390	S544-5624
z/OS Licensed Program Specifications	GA22-7503
PSF for OS/390 & z/OS: Messages and Codes	G544-5627
PSF for OS/390 & z/OS: User's Guide	S544-5630

Table 1. Related Publications (continued)

Title	Order Number
PSF for OS/390 & z/OS: Security Guide	S544-3291
z/OS Infoprint Server Introduction	S544-5742

For additional information about OS/390, z/OS, and PSF for OS/390, refer to these Web pages:

```
http://www.ibm.com/s390/os390/
http://www.ibm.com/servers/eserver/zseries/zos/
http://www.ibm.com/printers/R5PSC.NSF/web/psf390home
```

To obtain downloads for Windows® systems, including the Infoprint Port Monitor, the AFP Viewer plug-in, the AFP Printer Driver, and Network Printer Manager (NPM) for the Web, refer to the IBM Printing Systems Division Web page:

```
http://www.ibm.com/printers/download.html
```

To obtain the latest documentation updates for OS/390 base elements and optional features that result from DOC APARs and PTFs, refer to the DOC APARs and ++HOLD DOC Web page:

```
http://www.ibm.com/s390/os390/bkserv/new_tech_info.html
```

To obtain the latest documentation updates for PSF for OS/390, refer to the members in SYS1.SAMPLIB listed in Table 2:

Table 2. SYS1.SAMPLIB Members

Member	Publication
APSGCUS3	*PSF for OS/390 & z/OS: Customization*, S544-5622
APSGDGN3	*PSF for OS/390 & z/OS: Diagnosis*, G544-5623
APSGDLG3	*PSF for OS/390 & z/OS: Download for OS/390*, S544-5624
APSGMAC3	*PSF for OS/390 & z/OS: Messages and Codes*, G544-5627
APSGSEC3	*PSF for OS/390 & z/OS: Security Guide*, S544-3291
APSGUSR3	*PSF for OS/390 & z/OS: User's Guide*, S544-5630

Using LookAt to View Message Explanations

LookAt is an online facility that lets you view explanations for OS/390 and z/OS messages, system abends, and some codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can access LookAt from the Internet at:

```
http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/lookat.html
```

or from anywhere in OS/390 or z/OS where you can access a TSO command line (for example: TSO prompt, ISPF, UNIX® System Services running OMVS).

To find a message explanation on the Internet, go to the LookAt Web site and simply enter the message identifier (for example, `IAT1836` or `IAT*`). You can select a

specific release to narrow your search. You can also download code from the *z/OS Collection* and the LookAt Web site so you can access LookAt from a PalmPilot (Palm VIIx suggested).

To use LookAt as a TSO command, you must have LookAt installed on your host system. You can obtain the LookAt code for TSO from a disk on your *z/OS Collection* or from the LookAt Web site. To obtain the code from the LookAt Web site, do the following:

1. Go to

   `http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/lookat.html`
2. Click the **News** button.
3. Scroll to **Download LookAt Code for TSO and VM.**
4. Click the ftp link, which will take you to a list of operating systems. Select the appropriate operating system. Then select the appropriate release.
5. Find the **lookat.me** file and follow its detailed instructions.

To find a message explanation from a TSO command line, simply enter: **lookat** *message-id*. LookAt will display the message explanation for the message requested.

Note: Some messages have information in more than one book. For example, IEC192I has routing and descriptor codes listed in *z/OS MVS Routing and Descriptor Codes*. For such messages, LookAt prompts you to choose which book to open.

Summary of Changes

Summary of Changes for PSF for OS/390 & z/OS: Introduction, G544-5625-03

This publication contains additions and changes to information previously presented in *PSF for OS/390: Introduction*, G544-5625-02. The technical additions and changes are marked with a revision bar (|) in the left margin.

The following changes have been made throughout the book:

- References to PSF/2 have been replaced with Infoprint Manager for Windows NT® and Windows 2000.
- References to PSF for AIX® have been replaced with Infoprint Manager for AIX.
- References to OS/390 Printer Port Monitor have been changed to Infoprint Port Monitor.
- References to the MVS™ platform, IP PrintWay™, NetSpool™, and the OS/2® platform have been removed.
- PSF 3.3.0 accepts XML data. XML has been included where appropriate.

The following information is new or updated:

- The AFP Printer Driver and the AFP Viewer plug-in for Windows are no longer components of Infoprint Server for z/OS 1.2 and higher. However, these two programs are still available at no charge from the IBM Printing Systems Division Web page.
- A new section has been added that explains how to use the LookAt tool to view OS/390 and z/OS message explanations. See “Using LookAt to View Message Explanations” on page viii.
- OS/2 Warp server has been withdrawn. This is reflected in “Distributed Printing Options” on page 5.
- Enhancements in PSF 3.3.0 are described in “New Capabilities” on page 6.
- “Hardware Requirements” on page 8 has been updated.
- “Software Requirements” on page 8 has been updated.
- A list of features and products that are no longer available has been added to “Compatibility” on page 9.
- A new appendix has been added that describes the accessibility features available in OS/390 and z/OS. See “Accessibility” on page 25.

Chapter 1. Overview of PSF for OS/390

Print Services Facility (PSF) for OS/390 is an IBM licensed printer-driver program that manages and controls data transmitted to Advanced Function Presentation (AFP) printers that are channel-attached, SNA-attached, or TCP/IP-attached. PSF 3.3.0 for OS/390 is a replacement for PSF/MVS 2.2.0, PSF 3.1.0 for OS/390, and PSF 3.2.0 for OS/390 and has productivity enhancements, usability enhancements, and new application support. Here are some of the ways these improvements benefit you:

- Formatting capabilities let you format and print output from Extensible Mark-up Language (XML) applications.
- A system programmer or operator can track and display TCP/IP status to enable faster problem identification and resolution for TCP/IP printers.
- The AFP Statistics (AFPSTATS) option lets you generate a report that contains job information, including which resources were used, where each resource was used, what significant events occurred during processing, and more.
- You can dynamically include overlays and page segments in line data.
- You can specify finishing options, such as stapling, for a group of pages within a document.
- You can print input data as 2D bar codes.
- A system programmer or operator can obtain a report containing information about the functional characteristics of a printer without taking a PSF trace or dump.
- Line Mode Migration now supports FCB4s.

To understand what PSF for OS/390 can do for you, you must first understand the relationship between AFP and PSF.

Understanding AFP and PSF

AFP is an architected system of hardware and software for creating, formatting, viewing, retrieving, printing, and distributing information on a wide variety of printer and display devices. First introduced in 1984 to support the IBM 3800 Model 3 high-speed printer, AFP now supports new printing technology and new functions. From tabletop printers to high-speed production printers, AFP currently supports a full family of impact and nonimpact printers. These printers include those with both continuous form and cut-sheet capability and those with a choice of channel and communication attachments.

The AFP architecture governs the creation and control of data types (such as text, font, image, graphics, bar code, fax, color, audio, and multimedia) so that computer output is more readable and attractive. AFP's specific interchange architecture, called Mixed Object Document Content Architecture for Presentation (MO:DCA-P), makes information interchange possible among different platforms using different protocols. These platforms include:

- OS/390 and z/OS
- VM
- VSE
- OS/400®
- AIX
- Windows NT and Windows 2000

Figure 1 shows the platforms on which AFP is supported. The AFP architecture supports a variety of network protocols and numerous input and output data streams.

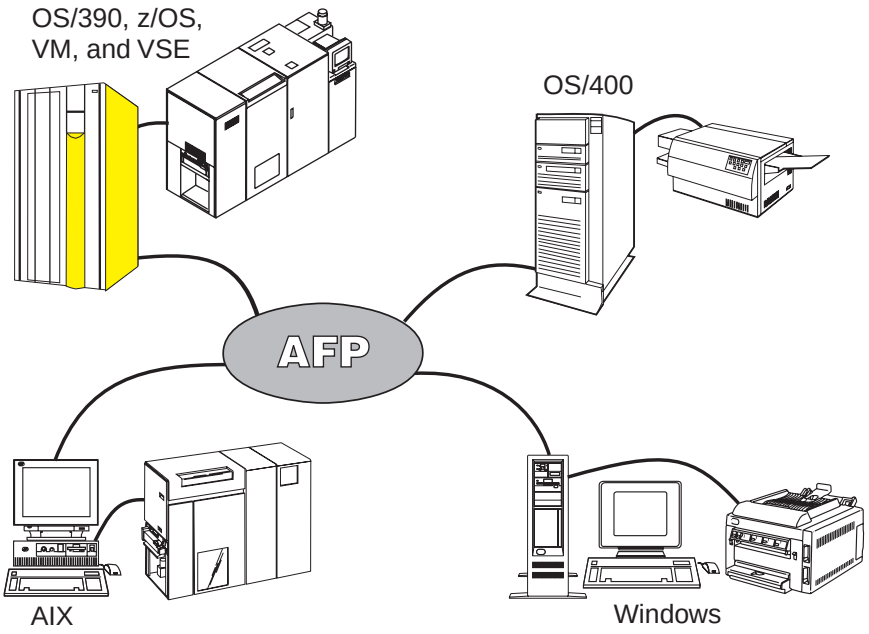

Figure 1. Platforms on Which AFP Is Supported

Components of AFP Printing

Two strategic AFP presentation data streams are key components of the architected AFP printing solution:

- MO:DCA-P data stream is the application data stream through which applications can describe pages composed of text, images, and graphics data. MO:DCA-P is device independent; therefore, applications that produce this data stream can be directed to any of the printers supported by the AFP system or to graphical personal computer displays for viewing. Two IBM products are examples of applications that capitalize on MO:DCA-P:
  - AFP Toolbox produces documents with extended formatting capabilities.
  - Document Composition Facility (DCF) is a host-based publishing product that produces high-quality, complex documents.
- Intelligent Printer Data Stream™ (IPDS™) is the printer device data stream that contains the information necessary to identify, monitor, and control the functions of the printer. IPDS enables a two-way dialog between the printer and the printer driver to create a cooperative print management system. IPDS is device dependent and is unique for each printer.

PSF is the glue between the application and the printer. PSF accepts MO:DCA-P, line data, and XML and converts them into IPDS for each AFP printer it manages. Because MO:DCA-P and IPDS are part of the same architecture, this is a very efficient process for applications that produce MO:DCA-P.

PSF products are supported under OS/390, z/OS, VSE, VM, AIX and OS/400. PSF has similar capabilities in all environments, plus differences unique to the operating system on which it is running. Table 3 on page 3 shows the AFP platforms and the PSF products they support.

Table 3. AFP Platforms and Corresponding PSF Products

Platform	PSF Product
OS/390 and z/OS	PSF for OS/390
VSE	PSF/VSE
VM	PSF/VM
AIX	Infoprint Manager for AIX
OS/400	PSF for OS/400
Windows NT, Windows 2000	Infoprint Manager for Windows NT and Windows 2000

Figure 2 shows the basic components required to print data on AFP printers in an OS/390 environment. The PSF printer-driver program processes data streams from the job entry subsystem (JES) spool, combines the data streams with resources needed to print the data, converts the data into IPDS, and sends the result to the printer.

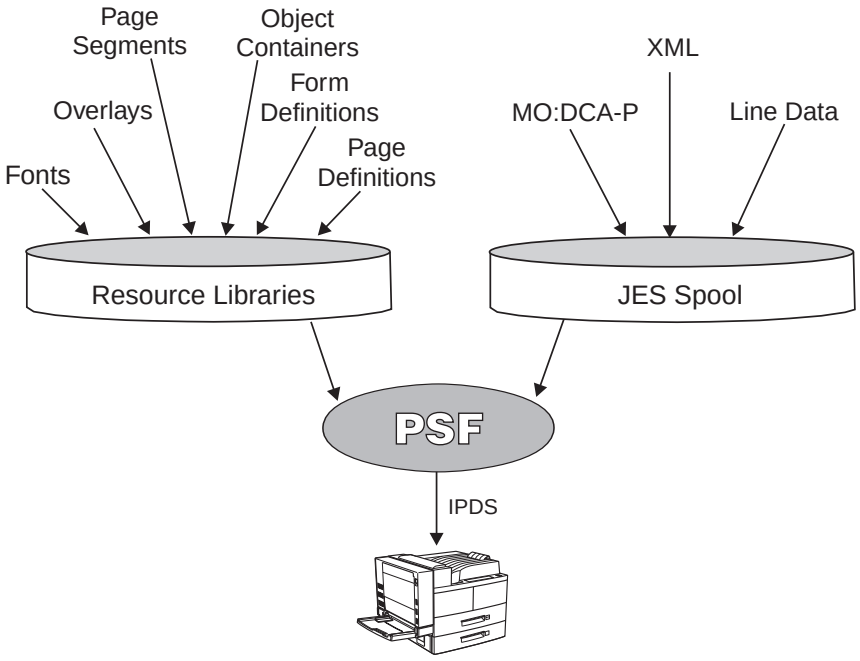

Figure 2. Components Required to Print Data on AFP Printers

Data Streams

The data streams placed on the JES spool are:

Line data Application data that is prepared for printing, without any data placement or presentation information. Line data can be traditional, which is prepared for printing on a line printer, such as a 6262 or 3211, or record format, where each record is preceded by a 10–byte identifier. For printing on page printers, a page definition is required to provide the data placement and presentation information.

MO:DCA-P Data that is already composed into pages, including data placement and presentation information (such as which font to use).

XML Data that has been identified using Extensible Markup Language

(XML) standards from the World Wide Web Consortium. XML does not describe data placement or presentation information. For printing on page printers, a page definition is required to provide the data placement and presentation information. The XML data processed by PSF can be encoded in EBCDIC, ASCII, UTF-8 or UTF-16.

The data stream that PSF produces is:

IPDS Data sent to the printer that contains data and the controls defining how the data is to be presented.

Resources

The resources needed to print the data are:

Fonts Graphics characters of a given style that are used to present text.

Overlays Predefined data objects (such as boxes, lines, shading, text, logos, bar codes, and graphics) that can be merged with application data for presentation. Overlays are often used as electronic forms.

Page segments Image, graphics, and bar code data objects that can be presented at any location on a page. Examples of items that can be page segments include logos, signatures, bar charts, and engineering drawings.

Form definitions Information that defines the presentation of the page on the medium, such as where the page should be placed on the medium and whether the data should be printed on one or both sides of the paper.

Page definitions Information that formats line data or XML data into AFP pages.

Object containers Objects that have a set of structured fields used to carry object data for a variety of objects. An Encapsulated PostScript object container is an example.

How PSF for OS/390 Manages AFP Printing

PSF is the printing subsystem that combines print data with resources to manage and control data transmitted to AFP printers. PSF transforms data streams from the JES spool into the data stream required by each printer (using processing and printing options specified by the user and the installation) and then transmits the data to the AFP printer. PSF for OS/390 processes these types of data from the JES spool:

- Line data, which is not formatted into pages. PSF merges line data with formatting instructions in a page definition print resource to produce all-points-addressable page formats completely external to the application program. A form definition print resource is then used to select media options and place the formatted pages on the medium.
- XML data, which is not formatted into pages. PSF merges line data with formatting instructions in a page definition print resource to produce all-points-addressable page formats completely external to the application

program. A form definition print resource is then used to select media options and place the formatted pages on the medium.

- MO:DCA-P data, which is already fully formatted into pages. PSF combines the formatted pages with any external resources, such as electronic forms or images, and creates commands to drive the AFP printers.

PSF also processes a combination of line data and MO:DCA-P data. This is called a mixed data stream.

Communication between PSF and the Printer

PSF converts MO:DCA-P, line data, and XML data from the JES spool into IPDS. IPDS contains information about a printer, such as the characteristics of the printer, its resolution, what resources it has, whether it has sufficient memory, and whether it receives and prints a job. PSF communicates back and forth with the printer through IPDS in order to successfully manage and control the data transmitted to the printers. For example:

1. PSF sends a print job to a printer.
2. The printer uses IPDS to tell PSF that it either does not have a resource loaded or it does not have enough memory to print the job.
3. PSF sends the resource to the printer or removes unneeded resources to provide more memory.

This two-way dialog between PSF and the printer provides error recovery unmatched in other print management systems. Because PSF sends IPDS formatted pages to the printer, the printer can tell PSF the status of each page of a print job as it is processed. PSF therefore knows the last successfully printed page and can recover the print job from that page if an error is encountered. This page-level error recovery contrasts with other systems' job-level recovery, where a continuous stream of data is sent through the printer and recovery of a job might or might not be possible. PSF's page-level recovery prevents duplicate or missing pages in such important documents as billing statements, financial statements, and published books, as long as documented operational procedures are followed.

Distributed Printing Options

In addition to FICON™, ESCON®, and parallel channel-attachment, PSF provides many options for distributed AFP printing using either SNA or TCP/IP communication protocols. Distributed printing options vary depending on the capabilities of printers and servers. PSF supports these options for sending jobs to AFP printers:

- Use SNA to send print jobs directly to printers through a token-ring LAN or Synchronous Data Link Control (SDLC).
- Use TCP/IP to send print jobs directly to LAN-attached printers.
- Send print jobs over SNA to printers attached to a PSF Direct print server running on Infoprint Manager for Windows NT and Windows 2000, or an AIX server with Infoprint Manager for AIX. The servers can support multiple printers on a LAN, and printers and print jobs remain under the centralized control of a JES operator.
- Send print jobs over TCP/IP to printers attached to the DPF running on Infoprint Manager for Windows NT and Windows 2000. Print jobs are sent to the Infoprint Manager spool, and printers and print jobs are managed at the remote location.
- Send print jobs from LAN and AIX applications to printers attached to OS/390 through Infoprint Manager for Windows NT and Windows 2000, or Infoprint Manager for AIX.

Several PSF optional features, such as Download for OS/390 and AFP Upload, provide more options for distributed printing. See “Features” on page 11 for information about these optional features.

What Can PSF for OS/390 Do for You?

PSF’s system management functions create a fully integrated, automated printing system. You can use PSF for OS/390 to do the following:

- Receive print jobs, access resources required by the print jobs, and send print commands to the printer.
- Manage resources required for the print job, such as form definitions, page definitions, fonts, page segments, and overlays.
- Handle print jobs that are formatted at different resolutions and select the resource libraries with the correct resolution to print the data.
- Provide operator control of printers.
- Provide problem diagnosis and error recovery.
- Restart printing from checkpoints.
- Write accounting records.
- Write separator pages between print jobs or copies of print jobs.
- Let installations manage resources; modify output records, separator pages, and accounting records; and inspect messages.

New Capabilities

PSF has been enhanced in Version 3 Release 3.0 with new capabilities to address your requirements for improved productivity, usability and application support:

- **Productivity enhancements**
  - Display TCP/IP status

    Networked printing is now the norm, but little is known about the attachment status of a TCP/IP-attached printer without taking a trace. The new PSF DISPLAY command tracks and displays the status of a TCP/IP attachment to enable faster network problem identification and resolution.
  - **Line Mode Migration Enhancement**

    Line Mode Migration now supports FCB4s. This lets jobs printed on 3263 Model 5, 4248, or 6262 Model 14 printers to be seamlessly migrated for printing on a PSF-driven 64xx
- **Usability enhancements**
  - AFP Statistics (AFPSTATS) report

    An AFPSTATS report contains information about the resources used to print a document and about the job itself. This information is useful when you must change an application, move it to another system, or document it for recovery or outsourcing. You can also use the information to obtain statistical data about a print job or diagnose some print performance situations. You can print AFPSTATS reports or view them online.

    Resource information contained in the report includes the name and location of each resource used, how the resource was specified to the print server, pages it was used in, and more. Other data reported includes errors encountered and basic job information, such as the Job ID and number of pages in the job.
  - Display printer information

The Display function in PSF lets a system programmer or operator obtain a report of the functional characteristics of a particular printer without having to take a PSF trace or dump. Information returned in the report includes basic information, such as printer resolution and microcode level, as well as functions supported, such as IPDS 2D bar code symbologies, cut-sheet emulation, N-UP formatting, or outline fonts. This function is useful in multi-printer environments where it is important to know which printers can support an application.

  - Display TCP/IP status

    The new PSF DISPLAY command, described under Productivity enhancements, enables faster network problem identification and resolution.

- **New application support**
  - XML support

    The Extensible Markup Language (XML) is widely used for documents and data on the Web and for sharing data between applications in a work flow. PSF can use a page definition and a form definition to format XML tags.

  - New support of 2D bar code symbologies

    PSF now supports the Maxicode, PDF 417, and Data Matrix 2D bar code symbologies.

  - Select finishing options within a document

    Finishing options, such as stapling, can be applied to a group of pages in a document.

  - Dynamically include overlays and page segments

    PSF includes overlays and page segments dynamically in line data through information in the variable data. The page definition FIELD command is used to find the overlay and page segment names in the data.

Formatting and Media Capabilities

PSF provides output formatting that is independent of an application. Therefore, changes to an application do not affect formatting, and formatting changes do not affect an application. PSF supports these formatting and media capabilities:

- Print in different orientations.
- Specify where the printer should position the page origin.
- Select different fonts for lines or fields of data.
- Specify lines or fields to be printed in color.
- Specify outline fonts to be scaled by the printer in any size or aspect ratio.
- Print in any position on a page.
- Position print lines relative to other objects on a page.
- Specify data fields to be printed as bar codes.
- Specify data fields to be suppressed on some page copies of a document.
- Include electronic forms.
- Include page overlays and segments (images) anywhere on a page.
- Change formatting on a page-by-page basis within a job.
- Position multiple logical pages on a single sheet.
- Specify duplex printing.
- Draw vertical and horizontal rules.
- Vary line spacing.
- Select overlays, images, and formatting controls.
- Mix fonts within a line, page, or print record.
- Download outline and raster fonts to a printer.
- Print with outline and raster fonts resident in the printer.
- Offset copy groups or print files in the stacker.
- Print edge marks on copy groups.

- Select finishing options, such as stapling or binding.
- Select paper from multiple input bins, or route pages of the output to different output bins.

Hardware Requirements

PSF runs on the following zSeries™ and S/390® hardware:

- IBM zSeries 900 (z900)
- All models of the S/390 Parallel Enterprise Server™
- All models of the S/390 Multiprise® 2000
- All models of the S/390 Multiprise 3000
- All models of the IBM ES/9000® Processor Unit 9021, 9121, or 9221
- IBM ES/3090™ Models E, S, J, JH or 9000T processors
- PC Server S/390

Software Requirements

PSF runs on any supported level of these operating systems:

- z/OS 1.1 (5694-A01) or higher with supported levels of JES2 or JES3
- OS/390 2.8 (5647-A01) or higher with supported levels of JES2 or JES3

One of these system programs is required:

- SMP/E element of z/OS or OS/390
- SMP/E V3R1 (5655-G44) for z/OS and OS/390

The Communications Server element of z/OS or OS/390 is required with these functions, depending on printer attachments:

- SNA Services for SNA-attached printers
- IP Services for TCP/IP-attached printers

One of these is required to provide host fonts:

- AFP Font Collection 2.1.1 or higher (recommended). This version of the AFP Font Collection (5648-B33) contains character sets and code pages to support printing of the new euro currency symbol.
- AFP Font Collection 1.1.0 (does not contain euro support).
- The optional compatibility fonts feature of PSF (does not contain euro support). See “Compatibility Fonts” on page 11.

To use AFP Unicode fonts with PSF 3.3.0 the AFP Unicode Font PRPQ 5799–GHJ is required.

If you use AFP Conversion and Indexing Facility (ACIF) to format data, APAR PQ38247 is required for record formatting. APAR PQ54118 is required to format XML data with ACIF.

To use the Infoprint Server Printer Inventory with PSF, OS/390 2.8 or higher is required.

You might need to install one or more of these PTFs, depending on how your installation uses PSF:

- To specify RRLV fields in the Printer Inventory, you need one of these PTFs to Infoprint Server:
  - OS/390 2.8, OS/390 2.9, OS/390 2.10, and z/OS 1.1 systems: PTF UW82178
  - z/OS 1.2: PTF UW82668

- To use the FIELD command to select resource names, to print XML from a page definition, and to use medium level finishing, you need Page Printer Formatting Aid (PPFA) APAR PQ56307.
- To display printer information or generate an AFP Statistics (AFPSTATS) report using JCL keywords, use z/OS 1.2 or z/OS 1.3 with APAR OW52883.
- Record format page definitions require PPFA/370 and PTF UQ45507.
- Infoprint Server Printer Inventory has added support for the new PRTINFO keyword. To use the PRTINFO option, you need one of these:
  - For OS/390 2.8, OS/390 2.9, OS/390 2.10, and z/OS 1.1 systems: PTF UW83614.
  - For z/OS 1.1: PTF UW83615.

Compatibility

PSF 3.3.0 for OS/390 is upwardly compatible with PSF/MVS 2.2.0, PSF 3.1.0 for OS/390, and PSF 3.2.0 for OS/390.

The sample startup procedures in PSF 3.1.0 and higher have been modified to use the IBM Core Interchange fonts provided in the AFP Font Collection for OS/390, VM, and VSE (Program Number 5648-B33). If you use the sample startup procedures and you want to use fonts contained in the optional compatibility fonts feature of PSF for your header or trailer pages, PSF messages, and system default fonts, you should tailor the sample procedures to reference compatibility fonts rather than the Core Interchange Fonts.

The following features and products are no longer available:

- IP PrintWay and NetSpool are no longer optional features of PSF 3.3 for OS/390. See “Infoprint Server” on page 14 for information about the replacement product for IP PrintWay or NetSpool with PSF.
- PSF 3.1.0 for OS/390 and higher no longer includes the optional feature, Page Printer Migration Programs (PPMP). Customers currently using those programs should continue to use the program modules from PSF/MVS 2.2.0. The replacement product for PPMP is the XPort Services Offering on AIX. For additional information, contact your local IBM Printing Systems representative.
- AFP Application Programming Interface (API) is not a feature of PSF 3.1.0 and higher. See “AFP Toolbox” on page 12 for information about the replacement product for AFP API.

Limitations

PSF 3.3.0 supports downloaded and resident AFP outline fonts on IPDS printers with outline font capability. The optional compatibility fonts feature of PSF 3.3.0 contains only 240 dpi and 300 dpi raster font formats (see “Compatibility Fonts” on page 11).

TCP/IP Attachment Considerations

In order to print at rated speed on high speed printers, not only must the printer be capable of processing and imaging the data at high speeds, but the system and communications link must also be able to provide data to the printer fast enough to maintain this speed. PSF 3.3.0 provides significant improvement in the ability to deliver data over a TCP/IP link to high-speed production printers. This improvement lets PSF 3.3.0 support TCP/IP-attached Infoprint 3000 and Infoprint 4000 printer families. However, TCP/IP might not provide adequate data delivery rates for all applications or all system environments.

The ability to run production printing applications at rated speed on Infoprint 3000 and Infoprint 4000 printers attached directly to PSF over TCP/IP depends on these factors:

- Number of printers and the printing speeds
- Density of the application data stream, usually measured in average bytes per page
- Availability of CPU resources
- LAN bandwidth and utilization

Density of the application data stream can be a critical factor. TCP/IP-attached Infoprint 3000 and Infoprint 4000 printers are capable of receiving about one megabyte of data per second. While this is adequate for printing text jobs at rated speed on most high-speed printers or jobs with some image content on printers with lower rated speeds, some image intensive jobs might contain too much data to print at rated speed on some printers when TCP/IP-attached.

You can estimate the data rate required to run an application at rated speed on a specific printer with this calculation:

$$\text{bytes per second} = \frac{(\text{average bytes per page}) \times (\text{pages per minute})}{60}$$

Average bytes per page includes bytes of data on the page and AFP control bytes, which vary with the complexity of the application formatting. In addition, loading of AFP resources to the printer can add to the average byte load of a print job.

With PSF 3.3.0, FICON channel-attachment provides the fastest and most performance efficient attachment for high-speed production printers. As with using TCP/IP for other applications, using PSF 3.3.0 with TCP/IP-attached printers requires more CPU resource than using ESCON or parallel channel, for the same printers and applications. In general, TCP/IP attachment uses about the same amount of CPU as attachment through PSF Direct to an Infoprint Manager for AIX print server (SNA-communication attachment).

For best performance, each TCP/IP-attached Infoprint 3000 or Infoprint 4000 printer should be on a dedicated segment of a token-ring or Ethernet LAN, with the TCP/IP maximum transmission unit (MTU) size set to the largest supported value. Attachment through token ring might provide better performance for some applications than attachment through Ethernet, especially if the LAN is not dedicated.

Performance Considerations

The performance of PSF and its attached printers is dependent upon availability and efficiency of memory, storage, DASD, and channel and network resources in the system configuration. Performance is also highly dependent upon the content of the print data streams being processed. In general, data-intensive applications, such as those containing images, require more resources than applications containing plain text. If performance degradation is experienced, normal system performance analysis and tuning should be conducted before contacting IBM service.

Chapter 2. Features and Related Products

Features

These optional and separately orderable IBM features are available with PSF for OS/390:

- AFP Conversion and Indexing Facility (ACIF)
- AFP Upload
- Compatibility Fonts
- Download for OS/390

See “Compatibility” on page 9 for features and products that are no longer available.

ACIF

ACIF is a tool that lets you convert a line data or XML print file into a MO:DCA-P document, retrieve resources used by the document, and index the file for later retrieval and viewing. ACIF provides these functions across systems and platforms:

- Converts traditional and record format line data and XML print files to MO:DCA-P documents.
- Adds indexing tags to MO:DCA-P documents.
- Creates a separate index object file from the indexing tags in a MO:DCA-P document.
- Retrieves and packages AFP resources needed for printing or viewing a MO:DCA-P document.

Refer to *AFP Conversion and Indexing Facility: User’s Guide* for more information about ACIF.

AFP Upload

AFP Upload lets you submit a job to Infoprint Manager for AIX for printing on any printer supported by PSF for OS/390. AFP Upload receives the print data from AIX and places it on the JES spool for printing by PSF. Jobs submitted to AFP Upload from Infoprint Manager for AIX can contain any type of data stream that Infoprint Manager for AIX can transform to MO:DCA-P except XML.

Refer to *PSF for AIX: AFP Upload Configuration Guide Using TCP/IP* and *PSF for AIX: AFP Upload Configuration Guide Using SNA* for more information about AFP Upload.

Compatibility Fonts

IBM compatibility fonts are supplied with PSF 3.3.0 to provide compatibility between PSF applications and those printers and applications that were designed for IBM typewriters, 6670 laser printers, and the IBM 3800 printing subsystem. The compatibility fonts include 240-pel bounded box, 240-pel unbounded box, and 300-pel printer formats.

Download for OS/390

Download for OS/390 automatically transmits line data and MO:DCA-P data from the JES spool to remote systems using TCP/IP. This eliminates the need for manual print file transfer using File Transfer Protocol (FTP). A cooperating print server or archive server running on a remote system receives the data sets for printing with Infoprint Manager for Windows NT, Windows 2000, or AIX, or for archiving with

Content Manager OnDemand. Download for OS/390 provides high-speed data transfer, JES scheduling, job management, data integrity, and job accounting for distributed production print management. Download for OS/390 does not support XML data.

Refer to *PSF for OS/390 & z/OS: Download for OS/390* for more information about Download for OS/390.

Related IBM Products

You can use any of these IBM products with PSF:

- AFP Font Collection
- AFP Printer Driver
- AFP Toolbox
- AFP Viewer plug-in
- AFP Workbench
- Content Manager OnDemand
- Document Composition Facility (DCF)
- Graphical Data Display Manager (GDDM®)
- Infoprint Server
- Overlay Generation Language (OGL)
- Page Printer Formatting Aid (PPFA)
- System Display and Search Facility (SDSF)

AFP Font Collection

The IBM AFP Font Collection (Program Number 5648-B33) contains a wide selection of AFP fonts. It is the recommended source of AFP fonts for printing with PSF.

AFP Printer Driver

The AFP Printer Driver creates output in AFP format to allow printing on any of IBM's AFP printers controlled by PSF for OS/390.

The AFP Printer Driver is available for Windows 3.1, Windows 95/98, Windows 2000, and Windows NT. You can obtain the AFP Printer Driver at no extra charge from the IBM Printing Systems Division Web page: `http://www.ibm.com/printers/download.html`.

AFP Toolbox

AFP Toolbox (Program Number 5655-A25 for OS/390 and z/OS) assists application programmers in formatting printed output. Without requiring knowledge of the AFP data stream, AFP Toolbox provides access to sophisticated AFP functions through a callable C, C++, or COBOL interface. With AFP Toolbox you can:

- Combine variable data with electronic forms, electronic signatures, and images.
- Define variable length paragraphs.
- Draw fixed or variable depth and width boxes.
- Generate bar code objects.
- Draw horizontal and vertical fixed or variable length lines.
- Include indexing tags for use in efficient viewing, archival, and retrieval.
- Accent printed output with color and shading.
- Dynamically control fonts, including user-defined fonts.

- Precisely position and align text anywhere on a page using a wide variety of fonts.
- Create graphical data objects such as pie charts and bar charts.
- Create tables of any complexity.
- Draw circles, partial circles, ellipses, and partial ellipses.

AFP Toolbox is available on OS/390, z/OS, AIX, and OS/400 platforms.

AFP Viewer Plug-in

The AFP Viewer plug-in displays documents that are in AFP format, such as documents downloaded from the OS/390 host or from Web documents.

The AFP Viewer plug-in is available for Windows 95/98, Windows 2000, and Windows NT, and requires Netscape Navigator (Version 3.01 or higher) or Microsoft® Internet Explorer (Version 3.01, Level 4.70.1215 or higher). You can obtain the AFP Viewer plug-in at no extra charge from the IBM Printing Systems Division Web page: `http://www.ibm.com/printers/download.html`.

AFP Workbench

AFP Workbench (Program Number 5622-416) contains a viewer application that lets you display AFP files that are in MO:DCA-P format, including page segments and overlays. In addition, you can use the AFP Workbench to:

- Display ASCII files (ignoring graphic controls).
- Print files and parts of files on a printer attached to Windows.
- Clip a portion of the displayed page and scale it to improve readability.
- Copy one or more pages from an AFP document into a new AFP document.
- Convert a page or page segment to an AFP overlay.
- Convert an AFP overlay or page segment to a page.
- Change the form definition used to display an AFP file.
- View your documents in multiple-up presentation.
- Navigate through or search a document using indexing information, sheet numbers, page identifiers, or keyword strings.

AFP Workbench is available on Windows 3.1, Windows 95/98, Windows 2000, and Windows NT.

DCF

DCF (Program Number 5748-XX9) is an IBM licensed, text-processing program that you can use to create large, complex, printed documents. DCF contains a text formatter, SCRIPT/VS, that can process documents that include SCRIPT/VS control words and Generalized Markup Language (GML) tags, along with the text. DCF lets you add navigation information to your document and then retrieve it with AFP Workbench. DCF also supports HTML through a transform.

DCF runs on OS/390, z/OS, VM, and VSE.

Content Manager OnDemand

Content Manager OnDemand (Program Number 5655-A88), formerly EDMSuite™ OnDemand (Program Number 5622–662), is an IBM licensed, Web-enabled program that lets you automatically capture, index, archive, search, retrieve, present, and reproduce stored computer-generated documents and other business-related data. Content Manager OnDemand supports several types of report file data streams, including MO:DCA-P data streams that contain line data mixed with AFP structured fields and line data formatted with a page definition.

Content Manager OnDemand runs on OS/390, z/OS, OS/400, AIX, Windows NT, and Windows 2000.

GDDM

GDDM (Program Number 5645–001) is a base element of OS/390 and z/OS that application programs can use to create page segments. GDDM also takes vector graphics data from other application programs and converts it into page segments needed for printing on AFP printers. After the page segment is created or the vector graphics data is converted into a page segment, the page segment can be printed by itself, included in a document by DCF or AFP Toolbox, or included in an overlay by OGL.

GDDM runs on OS/390, z/OS, VM, and VSE.

Infoprint Server

Infoprint Server is an optional feature of OS/390 (Program Number 5647-A01) and z/OS (Program Number 5694-A01). It supports printing on OS/390 printers, including AFP printers and local and remote printers in a TCP/IP network. Infoprint Server lets you submit print requests from remote workstations in a TCP/IP network, from UNIX System Services applications, from batch applications, and from VTAM® applications, such as CICS® or IMS™. Infoprint Server consists of these components:

- Windows Client, which contains the Infoprint Port Monitor. On releases earlier than z/OS 1.2, the Windows Client also includes the AFP Viewer plug-in and the AFP Printer Driver.
- NetSpool
- Print Interface
- IP PrintWay™
- Printer Inventory Manager
- Transform Manager and Infoprint Server Transforms
- SNMP subagent

Figure 3 on page 15 shows how some of the components of Infoprint Server complement PSF for OS/390 in providing an integrated print processing solution. The shaded components are parts of the solution:

1. The AFP Printer Driver creates AFP output for printing on AFP printers, the AFP Viewer plug-in lets you view documents in AFP format, and the Infoprint Port Monitor sends files to Print Interface so Windows users can print documents on AFP and other OS/390 printers.
2. Print Interface sends jobs to the JES spool from remote platforms and from UNIX System Services.
3. Print Interface uses data transforms provided by Infoprint Server Transforms to transform PCL, PostScript, or PDF data streams to AFP format.
4. NetSpool sends jobs to the JES spool from VTAM applications, such as CICS or IMS.
5. IP PrintWay takes jobs from the JES spool and sends them to TCP/IP-attached network printers.
6. PSF for OS/390 takes jobs from the JES spool and prints them to local and remote AFP printers.

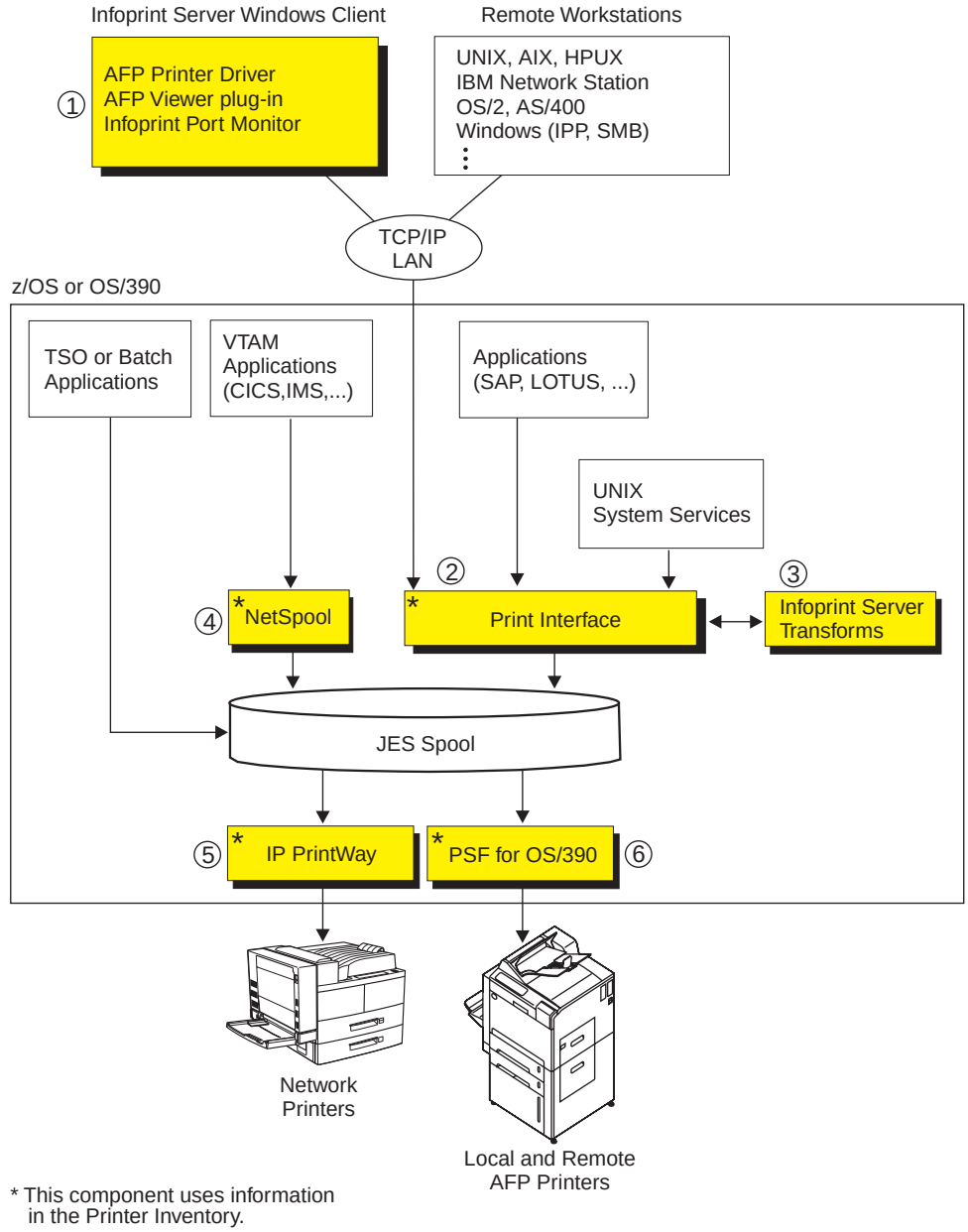

Figure 3. Infoprint Server and PSF for OS/390 Print Processing Solution

Infoprint Server has a Printer Inventory that manages the inventory of printer information that is used by IP PrintWay, NetSpool, Print Interface, and PSF. These applications obtain information from the Printer Inventory to validate print requests and allocate data sets on the JES spool for local and remote OS/390 printers. PSF users can define printer initialization parameters, trace parameters, and optional functions in the Printer Inventory instead of in the PSF startup procedure and installation Exit 7. Using the Printer Inventory avoids the need to restart all the printers in a startup procedure when you change parameters. Only the printer for which parameters are changed needs to be restarted.

Refer to *z/OS Infoprint Server Introduction* for more information about the Infoprint Server.

Infoprint Server Transforms

IBM Infoprint Server Transforms (Program Number 5697-F51) provides transforms for Infoprint Server. These transforms convert PCL, PostScript, or PDF data streams to AFP format so that these data streams can be printed on AFP printers controlled by PSF for OS/390. These Infoprint Server Transforms are available at no charge to Infoprint Server customers.

Three priced features of Infoprint Server Transforms provide transforms to convert data in AFP format to PCL, PostScript, or PDF data streams so that you can print AFP data on your PCL and PostScript network printers. Transforming to PDF allows you to post your AFP documents on the Web. For more information about the Infoprint Server Transforms, refer to *z/OS Infoprint Server User's Guide*.

Infoprint Server Transforms also includes a Coaxial Printer Support feature that lets you attach VTAM-controlled printers.

OGL

OGL (Program Number 5688-191) is an IBM licensed program you can use to create and modify electronic versions of your preprinted forms, called *overlays*. After you create an overlay, OGL can store it in a resource library. You can then include the overlay with your form definition to print up to 254 different overlays on a side of paper.

OGL runs on OS/390, VM, and VSE.

PPFA

PPFA (Program Number 5688-190) is an IBM licensed program you can use to create form definitions and page definitions. After creating these resources, you can store them in a resource library and then use them for printing application data.

PPFA runs on OS/390, VM, and VSE.

SDSF

SDSF, an optional feature of z/OS and OS/390, provides you with information to monitor, manage, and control jobs, printers, queues, and resources in a JES2 system. With SDSF, you can:

- Control job processing.
- Monitor jobs while they are running.
- Browse jobs without printing.
- Control printers and initiators.
- Control network lines and nodes.
- Control spool offload devices.
- Issue JES2 and MVS commands that affect jobs.

Other Related Products

You can use any of these IBM business partner products with PSF:

- Autograph
- Custom Statement Formatter (CSF)
- Dialogue
- DOC1
- DocuRight
- Opus
- Papyrus

- Printer Resource Software (PReS)
- The TransFormer

Note: The Web site addresses referred to in this section are current as of March 2002.

Autograph

Autograph is an integrated family of products from Document Sciences Corporation. Autograph automatically assembles a document from any information source and presents it on a variety of output devices, from printers to online viewing platforms. For more information about Autograph , refer to this Web site: `http://www.docscience.com`.

CSF

CSF is a document composition software product from Metavante (formerly M&I Data Services) that produces and manages high volumes of personalized customer documents, such as bank statements, credit cards, and bills. For more information about CSF, refer to this Web site: `http://www.metavante.com`.

Dialogue

Dialogue is a software solution from Exstream Software, Inc. that combines personalized document creation, campaign management, tracking, and content management in one tool. Dialogue generates all types of business communications for Internet, e-mail or mail delivery. For more information about Dialogue, refer to this Web site: `http://www.exstream.com`

DOC1

DOC1 is a WYSIWYG document composition system from Group 1 Software. DOC1 designs individualized documents, such as statements, directives, bills, and other communications, that can be processed and managed across multiple platforms. For more information about DOC1, refer to this Web site: `http://www.g1.com/doc1/`.

DocuRight

DocuRight is a document processing tool from Firstlogic, Inc. that employs Microsoft Word capabilities to let you create and print personalized business documents, such as statements, invoices, policies, and newsletters for use with high-speed production printers. For more information about Firstlogic's products, refer to this Web site: `http://www.firstlogic.com`.

Opus

Opus is a Windows-based integrated document composition and production system from Elixir Technologies Corporation. Opus is a product that develops, prints, and presents documents that are tailored to meet individual customer needs. For more information about Opus, refer to this Web site: `http://www.elixir.com/products/opus.asp`.

Papyrus

Papyrus is a WYSIWYG document automation solution from ISIS. Papyrus enables development, production, and management of business documents. For more information about Papyrus, refer to this Web site: `http://www.isis-papyrus.com`.

PReS

PReS is a PC-based document composition tool from PrintSoft. PReS accepts data from a wide range of systems, formats it into complex, personalized documents, and prints the documents on high-speed, electronic printers. For more information about PReS, refer to this Web site: `http://www.printsoft.com.au`.

The TransFormer

The TransFormer is a mainframe print and data manipulation tool from The Harris Group. The TransFormer lets users quickly and inexpensively modify and enhance output without changing application programs in any way. The TransFormer can:

- Create, reformat, and redesign print and electronic output.
- Apply application output to postal discount software.
- Convert jobs to laser printers from impact printers or another laser printer type.
- Facilitate the use of finishing equipment by merging and combining documents and creating and positioning bar codes.

For more information about The TransFormer, refer to this Web site: `http://bellhowell.mailmessaging.com/`.

Chapter 3. Using PSF for OS/390

This chapter describes how you can use PSF for OS/390 in your particular environment to meet your printing needs. It includes these printing scenarios:

- Centralized production printing with post processing
- Data transmitted for archiving or printing
- Large documents printed and finished on LAN-based printers
- CICS or IMS output data printed on network printers
- Data printed from the Web
- Formatted output printed on remote printers

Printing Centralized Production Output with Post Processing

An investment brokerage firm delivers thousands of statements a week to its clients. To meet weekly print deadlines and control costs, the brokerage firm wants to use a high-speed printer with an automated output solutions manager, such as the Infoprint 4000.

Here is how this brokerage firm can use PSF for OS/390 and its related products to meet the firm's requirements:

1. The brokerage firm uses PPFA to create page definitions and form definitions and OGL to create overlays. These resources are then stored in a resource library.
2. A batch application submits print files to the JES spool.
3. JES selects the print job to be printed by PSF. PSF then combines it with the page definition, form definition, and overlay from the resource library, converts the data stream to IPDS, and transmits the IPDS to an Infoprint 4000 printer.
4. The post-processor attachments on the Infoprint 4000 split and merge the statements and then stuff them in envelopes for mailing.

Figure 4 shows how PSF directs a high volume of data to high-speed printers with automated post processing.

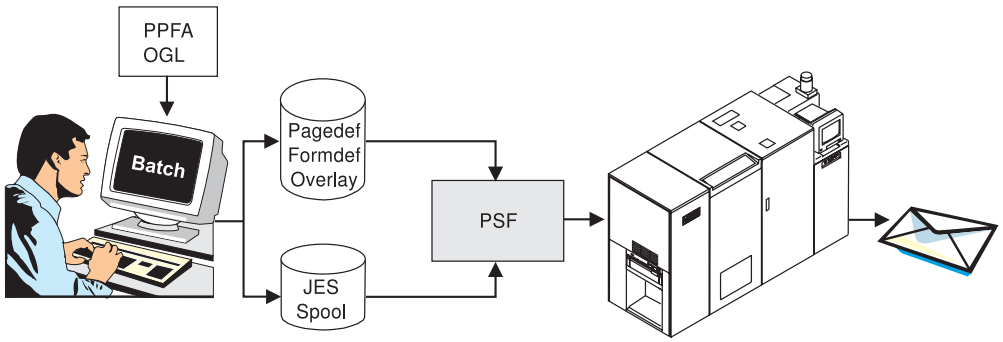

Figure 4. Printing Centralized Production Output with Post Processing

Transmitting Data for Archiving or Printing

A utility company produces monthly statements that it mails to its customers. It archives the statements so that when customers call with questions about their bills, customer service personnel can view the archived statement and print another copy of the statement, if necessary.

Here is how this company can use PSF for OS/390 features and related products to meet its requirements:

1. The utility company uses a page definition and line data on OS/390 to generate data for their monthly statements.
2. ACIF creates an indexed archive file from the page definition and line data.
3. The application on OS/390 submits the print file and ACIF submits the archive file to the JES spool.
4. JES selects the print job to be printed by PSF. PSF then transmits it to the Infoprint 4000 printer for printing and mailing to the customer.
5. JES selects the archive file to be transmitted by the Download for OS/390 feature of PSF. Download for OS/390 then transmits the file from the JES spool across the TCP/IP LAN to Content Manager OnDemand.
6. Content Manager OnDemand, on AIX, Windows NT, or Windows 2000 archives the files on CD-ROM.
7. When a customer calls, customer service personnel use the viewer application of the AFP Workbench to view the customer's statement, use Infoprint Manager for AIX to print another copy of the statement on an Infoprint 20, or do both.

Figure 5 shows how PSF automatically transmits data for archiving or printing:

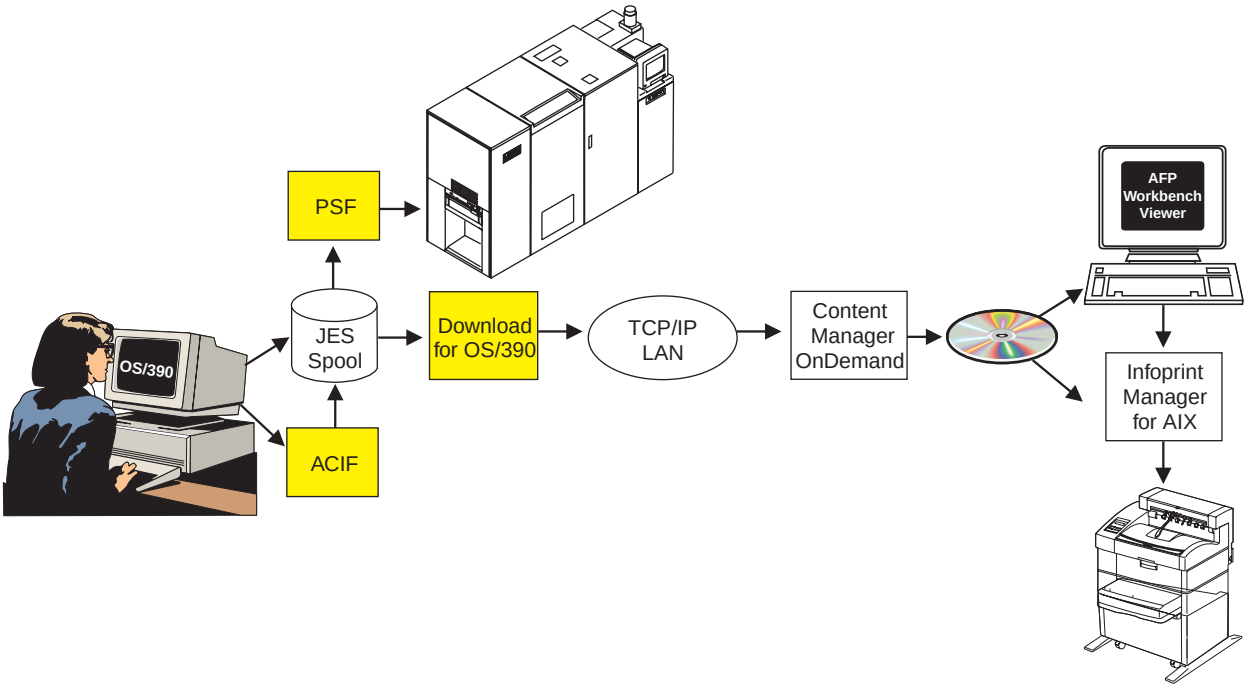

Figure 5. Automatically Transmitting Data for Archiving or Printing

Printing and Finishing Large Documents on LAN-Based Printers

A large production printing company uses a text-processing program, such as DCF, to create large, complex manuals. It then uses LAN-based printers, such as the Infoprint 60, to print and finish the manuals. This company is very concerned that the manuals it creates do not have any duplicate or missing pages.

Here is how this company can use PSF for OS/390 and its related products to print the company's manuals:

1. A user prepares a manual with DCF and formats the files for printing.
2. The user downloads the document to a workstation system and, using the viewer application of AFP Workbench, displays the document before sending it to the printer.
3. The user submits the print files from DCF to the JES spool with a form definition that specifies finishing.
4. JES selects the print job to be printed by PSF. PSF then transmits the print files to the selected printer on the TCP/IP LAN. The printer notifies PSF through IPDS about any errors encountered while printing. PSF's error recovery capabilities ensure that each page is printed and not duplicated, as long as the documented operational procedures are followed.

Figure 6 shows how PSF directs the data to LAN-based printers.

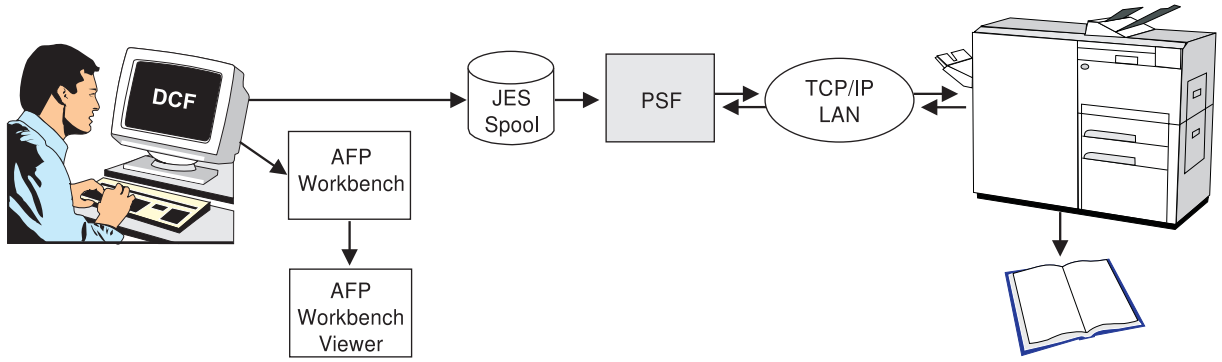

Figure 6. Printing Documents on LAN-Based Printers

Printing CICS or IMS Output Data on Network Printers

An international manufacturing company has a large investment in the IBM S/390. Recently, the company has configured a LAN and has purchased IPDS network printers to replace its coaxially-attached SNA printers.

This company wants to print inventory control reports from its CICS and IMS applications to the network printers, instead of to its usual set of SNA printers. The company wants to route the reports to one or more remote locations, such as warehouses, docks, and the plant floor.

Here is how this company can use the NetSpool component of Infoprint Server and PSF for OS/390 to meet its requirements:

1. The CICS or IMS applications submit print requests using VTAM in the same way they submit print requests to SNA printers. No changes to the CICS or IMS applications are required.
2. The NetSpool component of Infoprint Server intercepts the print requests and creates output data sets on the JES spool, using JES output parameters defined by the administrator. The JES output parameters specify routing information that PSF uses to transmit the output to a particular network printer.
3. PSF transmits the output data sets from the JES spool to one or more IPDS network printers on the TCP/IP LAN, with the full system management and error recovery capabilities of PSF.

Figure 7 shows how PSF directs the data to network printers.

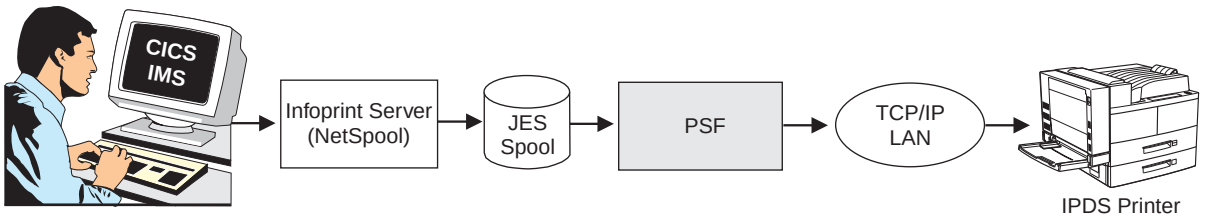

Figure 7. Printing CICS or IMS Output Data on Network Printers

Printing Documents from the Web

A market research firm wants to print Web documents on high-speed AFP printers attached to an S/390, such as the Infoprint 60.

Here is how this company can use the Infoprint Server components and PSF for OS/390 to meet its requirements:

1. From a Windows workstation, a user views a document from the Web using a browser, such as Netscape Navigator, or with the AFP Viewer plug-in if the document is in AFP format.
2. The user submits the document for printing using the standard print-submission method provided with the browser or viewer. The user selects an AFP printer defined to OS/390. The AFP Printer Driver creates an output file in AFP format.

   Note: The user can also download documents from the Web in HTML format and convert them to MO:DCA-P format with DCF. By using this method instead of the AFP Printer Driver, document elements, such as headers, the index, and the table of contents, are still usable.
3. The Infoprint Port Monitor automatically transmits the output file across the TCP/IP LAN to the Print Interface component.
4. The Print Interface component creates an output data set on the JES spool, using parameters defined by the administrator in the Printer Inventory or JES output statements. These parameters specify printing options that PSF uses to print output.
5. PSF prints the data set on the AFP printer.

Figure 8 shows how the Infoprint Server and PSF for OS/390 direct data from the Web to AFP printers.

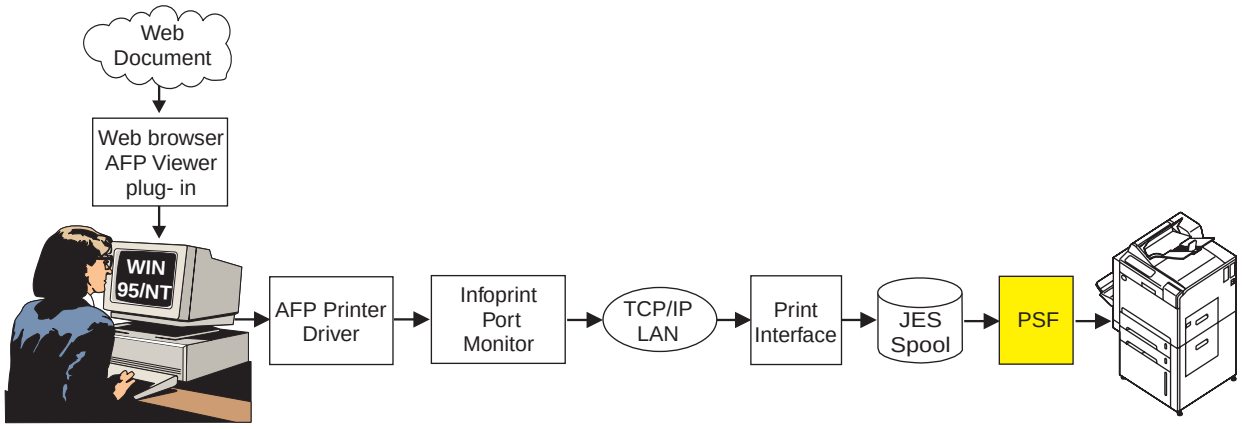

Figure 8. Printing Documents from the Web

Formatting Printed Output for Distribution to Remote Printers

A financial institution wants to use AFP Toolbox to develop all of its statements at one central location. It then wants to print bank statements and reports at each of its branch offices throughout the mid-Atlantic region with the confidence that every statement is printed, but not duplicated.

Here is how this financial institution can use PSF for OS/390 features and related products to meet its requirements:

1. The financial institution uses AFP Toolbox to generate statements, segments the statements by branch office, and stores them in separate files for printing.
2. AFP Toolbox submits the print files to the JES spool.
3. JES selects the print job to be printed by PSF. PSF then transmits the print files to PSF Direct through SNA LU 6.2 protocol for remote printing on an Infoprint Manager for AIX printer, such as the Infoprint 20. The printer notifies PSF through IPDS about any errors encountered while printing. PSF's error recovery capabilities ensure that each statement is printed and not duplicated, as long as the documented operational procedures are followed.

Figure 9 shows how PSF directs formatted output to remote printers.

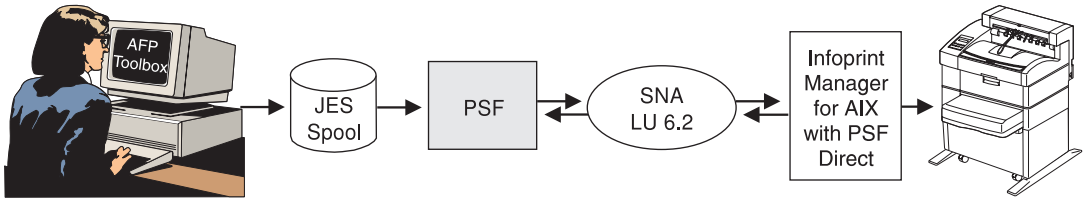

Figure 9. Formatting Printed Output for Distribution to Remote Printers

Appendix. Accessibility

Accessibility features help a user who has a physical disability, such as restricted mobility or limited vision, use software products successfully. The major accessibility features in OS/390 and z/OS let users:

- Use assistive technologies such as screen-readers and screen magnifier software.
- Operate specific or equivalent features using only the keyboard.
- Customize display attributes such as color, contrast, and font size.

Using Assistive Technologies

Assistive technology products, such as screen-readers, function with the user interfaces found in OS/390 and z/OS. Consult the assistive technology documentation for specific information when using it to access OS/390 and z/OS interfaces.

Keyboard Navigation of the User Interface

Users can access OS/390 and z/OS user interfaces using TSO/E or ISPF. For more information, refer to *z/OS TSO/E Primer*, SA22–7787, *z/OS TSO/E User's Guide*, SA22–7794, and *z/OS ISPF User's Guide Volume I*, SC34–4822. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

Notices

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EuroReady

PSF 3.3.0 for OS/390 is capable of processing data containing the euro sign. Font character sets and code pages that contain and map the euro sign consistently with the application must be present either in a host library or in the printer. AFP fonts that support the euro sign are included in the AFP Font Collection (Program Number 5648-B33).

Year 2000 Ready

PSF 3.3.0 for OS/390 does not have date dependencies and is therefore Year 2000 ready. When used in accordance with its associated documentation, PSF is capable of correctly processing, providing, and receiving date data within and between the twentieth and twenty-first centuries, provided all other products used with PSF (including software, hardware, and firmware) properly exchange accurate date data with it.

Glossary

This glossary defines technical terms and abbreviations used in PSF for OS/390 documentation. If you do not find the term you are looking for, see this publication's index or view *IBM Glossary of Computing Terms*, available from:

`http://www.ibm.com/ibm/terminology`

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Definitions that are specific to IBM products are so labeled—for example, "In SNA," or "In the 3820 printer."

These cross-references are used in this glossary:

- **Contrast with.** Refers to a term that has an opposite or substantively different meaning.
- **See.** Refers to multiple-word terms in which this term appears.
- **See also.** Refers to related terms that have similar, but not synonymous, meanings.
- **Synonym for.** Appears in the commentary of a less desirable or less specific term and identifies the preferred term that has the same meaning.
- **Synonymous with.** Appears in the commentary of a preferred term and identifies less desirable or less specific terms that have the same meaning.

A

ACIF. *AFP Conversion and Indexing Facility*.

Advanced Function Presentation (AFP). A set of licensed programs, together with user applications, that use the all-points-addressable concept to print data on a wide variety of printers or display data on a variety of display devices. AFP also includes creating, formatting, archiving, retrieving, viewing, and distributing information.

AFP. See *Advanced Function Presentation*.

AFP Conversion and Indexing Facility (ACIF). An optional feature of PSF for OS/390 that converts a print file into a MO:DCA-P document, creates an index file for later retrieval and viewing, and retrieves resources used by an AFP document into a separate file.

AFPDS. Advanced Function Presentation data stream. A presentation data stream that is processed in the AFP environment. MO:DCA-P is the strategic AFP interchange data stream. IPDS is the strategic AFP printer data stream.

AFP Font Collection. The recommended source of AFP fonts for printing with PSF.

AFP Printer Driver. A printer driver that runs on a Windows workstation and creates output in AFP format for printing on AFP printers. AFP Printer Driver is a component of Infoprint Server for OS/390 2.8 and higher and z/OS 1.1. It it not a component of Infoprint Server for z/OS 1.2 and higher.

AFP Toolbox. An IBM product that assists application programmers in formatting printed output. Without requiring knowledge of the AFP data stream, AFP Toolbox provides access to sophisticated AFP functions through a callable C, C++, or COBOL interface. AFP Toolbox is available on OS/390, z/OS, AIX, OS/2, and OS/400 platforms.

AFP Upload. An optional feature of PSF for OS/390 that lets you submit a job to Infoprint for AIX for printing on any printer supported by PSF for OS/390.

AFP Viewer plug-in. A program that runs on a Windows workstation and lets you view files in AFP format from a Web browser. AFP Viewer plug-in is a component of Infoprint Server for OS/390 2.8 and

higher and z/OS 1.1. It it not a component of Infoprint Server for z/OS 1.2 and higher.

AFP Workbench Viewer. An IBM product that lets you display AFP and ASCII files at your workstation in the same format they are printed.

AIX. Advanced Interactive Executive.

AIX operating system. IBM's implementation of the UNIX operating system. The RS/6000® system, among others, runs the AIX operating system.

all-points-addressable (APA). The ability to address, reference, and position text, overlays, and images at any defined position or pel on the printable area of the paper. This capability depends on the ability of the hardware to address and to display each picture element.

American Standard Code for Information Interchange (ASCII). The standard code, using a coded character set consisting of 7-bit coded characters (8-bit including parity check), that is used for information interchange among data processing systems, data communication systems, and associated equipment in an AIX environment. The ASCII set consists of control characters and graphic characters. (A) Contrast with *EBCDIC*.

APA. See *all-points-addressable*.

application program. (1) A program that performs a particular data processing task, such as inventory control or payroll. (2) A program that produces the print data set.

ASCII. See *American Standard Code for Information Interchange*.

C

channel-attached. In PSF, a device that is linked to the host system exclusively by use of zSeries or S/390 channel protocols. For example, a 3900 printer cabled to the host system with a S/390 channel adapter is considered a channel-attached printer. Contrast with *SNA-attached* and *TCP/IP-attached*.

CICS. See *Customer Information Control System*.

coexistence. Two or more systems that share resources at different software, service, or operational levels. Coexistence includes the ability of a system to respond to a new function that was introduced on another system with which it shares resources. The system can respond in these ways: ignore a new function, stop gracefully, or support a new function.

communication-attached. In PSF, a device that is SNA-attached and that uses a communication controller. For example, a 3812 printer attached to a 3174 control unit attached to a 3175 Communication Controller can be considered a communication-attached printer. Contrast with *local-attached*.

compatibility font. An AFP font designed to emulate the uniformly spaced and fixed-pitch fonts used with line printers.

Content Manager OnDemand. An IBM program that lets you automatically capture, index, archive, search, retrieve, present, and reproduce stored computer-generated documents and other business-related data. Formally known as EDMSuite OnDemand.

continuous forms. A series of connected forms that feed continuously through a printing device. The connection between the forms is perforated so that the user can tear them apart. Before printing, the forms are folded in a stack arrangement with the folds along the perforations. Contrast with *cut-sheet paper*.

Customer Information Control System (CICS). An IBM licensed program that enables transactions entered at remote terminals to be processed concurrently by user-written application programs. It includes facilities for building, using, and maintaining databases.

cut-sheet paper. The medium that is cut into uniform-size sheets before it is loaded into the printer. Contrast with *continuous forms*.

D

DASD. See *direct access storage device*.

data set. A named set of records stored and processed as a unit. Synonym for *file*.

data stream. (1) All information (data and control commands) sent over a data link, usually in a single read or write operation. (2) A continuous stream of data elements being transmitted, or intended for transmission, in character or binary-digit form using a defined format.

DCF. See *Document Composition Facility*.

direct access storage device (DASD). A computer storage device in which access time is, in effect, independent of the location of the data.

Distributed Print Function (DPF). A component of Infoprint Manager for Windows NT and Windows 2000 that you can install and use to print jobs from OS/390, z/OS, VSE, VM, or OS/400 systems. DPF receives PSF output and resources for spooling and printing with Infoprint Manager for Windows NT/2000. DPF lets PSF for OS/390, PSF/VSE, PSF/VM, and OS/400 send print files to Infoprint Manager for Windows NT/2000. DPF also stores PSF for OS/390 and PSF/VSE resources in the DPF resource library, so that the host system does not have to send PSF resources each time documents

are spooled. The Distributed Print Function of PSF/2 has been replaced by function available in Infoprint Manager for Windows NT and Windows 2000.

document. (1) One or more pages collected into a single job. (2) Data that has already been composed into pages and that contains a Begin Document and an End Document structured field. (3) In word processing, a collection of one or more lines of text that can be named and stored as a separate entity. (4) A publication or other written material pertaining to a specific subject or related subjects.

Document Composition Facility (DCF). An IBM licensed program that provides a text formatter called SCRIPT/VS. SCRIPT/VS can process files marked up with a unique set of controls and tags.

download. (1) To transfer programs or data from a computer to a connected device, typically a personal computer. (T) (2) To transfer data from a computer to a connected device, such as a workstation or a microcomputer. Typically, users download from a large computer to a diskette or fixed disk on a smaller computer or from a system unit to an adapter.

Download for OS/390. An optional feature of PSF for OS/390 that lets PSF automatically send data sets from the JES spool, without formatting them, directly to an Infoprint Manager for AIX, Infoprint Manager for Windows NT/2000, or OnDemand server, using TCP/IP. The Infoprint Manager and OnDemand servers receive data sets into files, which can be automatically formatted and printed by Infoprint Manager or loaded into OnDemand.

DPF. See *Distributed Print Function*.

E

EBCDIC. See *extended binary-coded decimal interchange code*.

electronic forms. A collection of constant data that is electronically composed in the host processor and can be merged with variable data on a page during printing.

electronic overlay. A collection of constant data, such as lines, shading, text, boxes, or logos, that is electronically composed in the host processor and stored in a library, and that can be merged with variable data during printing. Contrast with *page segment*.

ESCON. Enterprise system connection.

Ethernet. A 10 MB baseband local area network that allows multiple stations to access the transmission medium at will without prior coordination, avoids contention by using carrier sense and deference, and resolves contention by using collision detection and transmission. Ethernet uses carrier sense multiple access with collision detection.

extended binary-coded decimal interchange code (EBCDIC). A coded character set of 256 eight-bit characters. This is the normal (default) type of data encoding in an OS/390 environment. Contrast with *ASCII*.

F

file. (1) A set of related records treated as a unit. (2) A collection of related data that is stored and retrieved by an assigned name. (3) Linear data that can be opened, written, read, and closed. A file can also contain information about the file, such as authorization information. The name used to obtain a file includes the directories in the path to the file. (4) Strings of characters with no additional structure. Structure is assumed only by the processing programs. Files can be located relative to the current directory or by an absolute path name. (5) An object that can be written to, or read from, or both. A file has certain attributes, including access permissions and type. File types include regular file, character special file, block special file, FIFO special file, and directory. Other types of files can be defined by the implementation. (6) A collection of information or data that is organized by some method (relative, indexed, or serial, for example) and stored on a device such as a disk.

font. (1) A family or assortment of characters of a given size and style, for example, 9-point Bodoni Modern. (A) (2) One size and one typeface in a particular type family, including letters, numerals, punctuation marks, special characters, and ligatures. (3) A paired character set and code page that can be used together for printing a string of text characters. A double-byte font can consist of multiple pairs of character sets and code pages.

format. (1) The shape, size, and general makeup of a printed document. (2) To prepare a document for printing. (3) The arrangement of text on the page.

FORMDEF. A JCL parameter that specifies a form definition. See *form definition*.

form definition. A resource that defines the characteristics of the form, including overlays to be used (if any), paper source (for cut-sheet printers), duplex printing, text suppression, the position of MO:DCA-P data on the form, and the number and modifications of a page. Contrast with *page definition*.

G

GDDM. See *Graphical Data Display Manager*.

Graphical Data Display Manager (GDDM). An IBM licensed program that application programs can use to create page segments.

H

hardcopy. (1) A copy of a display image generated on an output device such as a printer or a plotter, in a form that can be carried away. (T) (2) A printed copy of machine output in a visually readable form—for example, printed reports, listings, documents, and summaries.

host system. (1) A data processing system that prepares programs and the operating environments for another computer or controller. (2) The data processing system to which a network is connected and with which the system can communicate.

I

IBM compatibility fonts. A group of fonts supplied as part of PSF and OS/400. Many of these fonts are derived from fonts created for specific IBM printers (such as the IBM 3800 Model 1) or applications (such as Document Composition Facility). The fonts are called compatibility fonts because they make it possible for applications created for the 3800 Model 1 printer to be migrated to page printers with no need to change the fonts specified in the applications. Examples of IBM compatibility fonts are APL, Boldface, Document, Essay, Format, Gothic, Letter Gothic, Orator, Prestige, Roman, Script, Serif, and Text type families, as well as a set of Proprinter Emulation fonts.

Infoprint Manager for AIX or Windows NT/2000. A software component of IBM Infoprint. IBM Infoprint Manager for AIX or Windows NT/2000 handles the scheduling, archiving, retrieving, and assembly of a print job and its related resource files. It also tracks the finishing and packaging of the printed product.

Infoprint Port Monitor. A component of the Infoprint Server that runs on a Windows 95/98, Windows NT or Windows 2000 workstation and sends a file for printing to the Print Interface running on the OS/390 system.

Infoprint Server. An element of OS/390 and z/OS that supports printing on OS/390 and z/OS printers, including local and remote printers in a TCP/IP network. Infoprint Server lets you submit print requests from remote workstations in a TCP/IP network, from UNIX System Services applications, from batch applications, and from VTAM applications, such as CICS or IMS applications. Infoprint Server consists of these components:

- Print Interface
- Printer Inventory Manager
- NetSpool
- IP PrintWay
- Transform Manager and Infoprint Server Transforms
- SNMP subagent
- AFP Printer Driver for Windows (OS/390 2.8–2.10 and z/OS 1.1 only; not z/OS 1.2 or higher)
- AFP Viewer plug-in for Windows (OS/390 2.8–2.10 and z/OS 1.1 only; not z/OS 1.2 or higher)
- Infoprint Port Monitor for Windows

installation exit. A subcomponent, installed and maintained for or by a customer installation, that calls exits; provides defaults for job header, trailer, and data-set header separator-page exits; and supports customer-written exits for logical records, SMF records, message processing, and resource management. PSF invokes these exits at certain predetermined times.

Intelligent Printer Data Stream (IPDS). An all-points-addressable data stream that enables users to position text, images, and graphics at any defined point on a printed page. IPDS is the strategic AFP printer data stream generated by PSF.

Internet Protocol (IP). In TCP/IP, a protocol that routes data from its source to its destination in an Internet environment.

IP. See *Internet Protocol*.

IP address. (1) In the Internet suite of protocols, the 32-bit address of a machine, expressed in dotted decimal notation, for example: 9.99.9.143. (2) Host name.

IPDS. See *Intelligent Printer Data Stream*.

J

JCL. See *job control language*.

JES. See *job entry subsystem*.

JES2. An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system. In an installation with more than one processor, each JES2 processor independently controls its job input, scheduling, and output processing.

JES3. An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system. In complexes that have several loosely coupled processing units, the JES3 program manages processors so that the global processor exercises centralized control over the local processors and distributes jobs to them via a common job queue.

JES spool. A program that performs a peripheral operation, such as printing, while the computer is busy with other work. A common name for the JES2 or JES3 spool.

job. One or more documents submitted together in one print request. Since the user can query, release, or cancel one or more of the documents within a job, each document within a job can have a different status.

job control language (JCL). A language of control statements used to identify a computer job or describe its requirements to an operating system.

job entry subsystem (JES). An MVS subsystem that receives jobs into the system, converts them to internal format, selects them for execution, processes their output, and purges them from the system.

L

LAN. See *local area network*.

line data. Application data that is prepared for printing, without any data placement or presentation information. See *record format line data* and *traditional line data*.

line printer. A device that prints a line of characters as a unit. Contrast with *page printer*.

local area network (LAN). (1) A computer network located on a user's premises within a limited geographical area. Communication within a local area network is not subject to external regulations; however, communication across the LAN boundary might be subject to some form of regulation. (T) (2) A network in which a set of devices are connected to one another for communication and that can be connected to a larger network.

local-attached. In PSF, an SNA-attached device that does not have a communications controller in its configuration. For example, a 3812 printer connected to a channel-attached 3174 control unit that is defined to the host system through VTAM is considered a local-attached printer. Contrast with *communication-attached*.

M

migration. Activities that relate to the installation of a new version or release of a program to replace an earlier level. Completion of these activities ensures that the applications and resources on your system will function correctly at the new level.

Mixed Object Document Content Architecture (MO:DCA). An IBM-architected, device-independent data stream for interchanging documents.

MO:DCA. See *Mixed Object Document Content Architecture.*

MO:DCA-P. Mixed Object Document Content Architecture for Presentation.

MO:DCA-P data. Print data that has been composed into pages. Text-formatting programs (such as DCF) can produce composed text data consisting entirely of structured fields.

MVS. Multiple Virtual Storage. An IBM operating system operating on an S/390 processor.

N

network. A collection of data processing products that are connected by communication lines for information exchange between locations.

Network Print Facility (NPF). In IBM TCP/IP, a feature that routes VTAM, JES2, or JES3 printer output to printers in a TCP/IP network.

NPF. See *Network Print Facility*.

O

object container. (1) A set of structured fields used to carry object data for a variety of objects. (2) A MO:DCA-architected envelope that contains data to be processed by COM; transparent to PSF. This data is classified as "non-presentation" data. A MO:DCA "Registered Object Identification" (ROID) field is defined for the object container to denote the data type. For a microfilm device, this ROID denotes the contained data as either setup data or tape label data.

OGL/370. See *Overlay Generation Language/370*.

OS/2. IBM's operating system for the IBM Personal System/2 or a compatible.

OS/390. An IBM operating system that includes and integrates functions previously provided by many IBM software products (including the MVS operating system) and:

- Is an open, secure operating system for the IBM S/390 family of enterprise servers
- Complies with industry standards
- Is Year 2000 ready and enabled for network computing and e-business
- Supports technology advances in networking server capability, parallel processing, and object-oriented programming

OS/400. IBM's operating system for AS/400® and iSeries™ processors.

overlay. See *electronic overlay*.

Overlay Generation Language/370 (OGL/370). An IBM licensed program that lets you create graphics by designing objects for electronic overlays, such as lines, boxes, shadings, and irregular shapes.

P

page. (1) A collection of data that can be printed on one side of a sheet of paper or a form. (2) The boundary for determining the limits of printing.

PAGEDEF. A JCL parameter that specifies a page definition. See *page definition*.

page definition. A resource used by PSF that defines the rules of transforming line data and XML data into MO:DCA-P data and text controls. Contrast with *form definition*.

page printer. A device that prints one page as a unit. Any of a class of printers that accepts MO:DCA pages, constructed of page data and images, among other things. (I) (A) Contrast with *line printer*.

Page Printer Formatting Aid/370 (PPFA/370). An IBM licensed program that lets you create and store form definitions and page definitions, which are resource objects for print-job management. These stored objects can then be used to format printed output. You can use PPFA on the following operating platforms: OS/400, OS/390, VM, VSE, and AIX. Infoprint Manager for Windows NT and Windows 2000 can use the form definitions and page definitions created by PPFA, but the PPFA product does not run on the OS/2 platform.

page segment. A resource containing MO:DCA data and images, prepared before formatting and included during printing. A page segment assumes the environment of an object in which it is included. Contrast with *electronic overlay*.

pel. See *picture element*.

picture element (pel). An element of a raster pattern about which a toned area on the photoconductor might appear. See *raster pattern*.

PostScript. A page description language with graphics capabilities that was developed by Adobe Systems, Incorporated.

PPFA/370. See *Page Printer Formatting Aid/370*.

preprinted form. A sheet of paper containing a preprinted design of constant data into which variable data can be printed. See also *electronic overlay*.

presentation device. A device, such as a printer, that produces character shapes, graphics pictures, images, or bar code symbols on a physical medium. Examples of physical media are display screens, paper, foils, microfilm, and labels.

Printer Inventory. A component of the Infoprint Server that provides a set of printer definitions, which are used by Print Interface, NetSpool, IP PrintWay, and PSF for OS/390. The Printer Inventory also provides Functional Subsystem (FSS) and Functional Subsystem Application (FSA) definitions, which are used by PSF for OS/390 and IP PrintWay. The definitions in the Printer Inventory contain information that these applications use to validate print requests and allocate output data sets on the JES spool for local and remote OS/390 and z/OS printers.

print file. A file created by an application program that contains the actual information to be printed and some of the data that controls the format of the printing. Print files can contain MO:DCA-P data, line data, XML data, or a combination of MO:DCA-P and line data.

Print Interface. A component of the Infoprint Server that accepts input from remote workstations that have TCP/IP access and from UNIX System Services printing commands and creates output data sets on the JES spool.

print job. The data that the user submits to PSF to be printed. The user can request that a print job be printed as though it were multiple data sets.

Print Services Facility (PSF). An IBM licensed program that manages and controls the input data stream and output data stream required by supported IBM page printers. PSF combines print data with other resources and printing controls to produce AFP output.

protocol. The meanings of and the sequencing rules for requests and responses by which network addressable units (PU, LU, SSCP, and VTAM programs) in a communication network coordinate and control data transfer operations and other operations.

PSF. See *Print Services Facility*.

PSF Direct. A function of Infoprint Manager for Windows NT and Windows 2000 or Infoprint Manager for AIX that enables another PSF program (PSF for OS/390, PSF/VM, PSF/VSE, or PSF/400) to print remotely. Uses the SNA LU 6.2 protocol on printers supported by Infoprint Manager for AIX and Infoprint Manager for Windows NT and Windows 2000. The PSF program sends the print data stream directly to the Infoprint Manager printer, bypassing the Windows or AIX spool. The operator of the originating system controls printing on the Infoprint Manager printers as if the printers were attached to the originating system.

R

raster pattern. (1) A series of picture elements (pels) in scan lines to form an image. See *picture element*. (2) A pattern of bits with 0 (off) and 1 (on) that define the pels in an image. A 1-bit is a toned pel.

record format line data. A form of line data where each record is preceded by a 10-byte identifier.

resource. A collection of printing instructions used by PSF, in addition to the print data set, to produce the printed output. PSF resources include coded fonts, font character sets, code pages, page segments, overlays, form definitions, and page definitions.

S

SDLC. See *Synchronous Data Link Control*.

SDSF. See *System Display and Search Facility*.

SNA. See *Systems Network Architecture*.

SNA-attached. In PSF, a device that is linked to the host system through VTAM and uses an SNA protocol to transfer data. It does not need to be physically connected to the host; some printers are attached to a control unit, a communication controller, or both, and they can transfer data over telecommunication lines. For example, a 3820 attached to a communication controller using the LU 6.2 communication protocol to transfer data to a communication controller is considered an SNA-attached printer. Contrast with *channel-attached* and *TCP/IP-attached*.

Synchronous Data Link Control (SDLC). A discipline for managing synchronous information transfer over a data link connection.

System Display and Search Facility (SDSF). An IBM-licensed program that provides a menu-driven, full screen interface to obtain detailed information about the jobs and resources in an MVS JES2 system.

Systems Network Architecture (SNA). The description of the logical structure, formats, protocols, and operational sequences for transmitting information units through networks, and controlling the configuration and operation of those networks..

T

TCP. See *Transmission Control Protocol*.

TCP/IP. See *Transmission Control Protocol/Internet Protocol*.

TCP/IP-attached. In PSF, a device that is linked to the OS/390 system through a TCP/IP network and receives data from the OS/390 system using the application-layer IBM protocol for IPDS printers. Some TCP/IP-attached printers require the i-data 7913 IPDS Printer LAN Attachment. Contrast with *channel-attached* and *SNA-attached*.

traditional line data. A form of line data that is prepared for printing on a line printer, such as 6262 or 3211.

Transmission Control Protocol (TCP). A communications protocol used in the Internet and in any network that follows the U.S. Department of Defense standards for inter-network protocol. TCP provides a reliable host-to-host protocol between hosts in packet-switched communications networks and in interconnected systems of such networks. It uses the Internet protocol as the underlying protocol.

Transmission Control Protocol/Internet Protocol (TCP/IP). A set of communications protocols that support peer-to-peer connectivity functions for both local and wide area networks.

U

UNIX. A highly portable operating system originally developed by Bell Laboratories that features multiprogramming in a multiuser environment. UNIX is implemented in the C language. UNIX was originally developed for use on minicomputers but has been adapted on mainframes and microcomputers. It is especially suitable for multiprocessor, graphics, and vector-processing systems. Many of the commands in the OS/390 UNIX System Services shell are based on similar commands available with UNIX System V.

UNIX System Services. OS/390 and z/OS services that support an environment within which operating systems, servers, distributed systems, and workstations share common interfaces.UNIX System Services supports standard application development across multivendor systems. It is required if you want to create and use applications that conform to the POSIX standard. UNIX System Services combines the personal power of the workstation, the flexibility of open systems, and the strength of MVS. It supports and fosters a superenvironment of larger operating systems or servers and of distributed systems and workstations that share common interfaces. Users can switch back and forth between the traditional TSO/E interface and the UNIX System Services interface. UNIX-skilled users can interact with the system, using a familiar set of standard commands and utilities. MVS-skilled users can interact with the system, using familiar TSO/E commands and interactive menus to create and manage hierarchical file system files and to copy data back and forth between MVS data sets and files. Application programmers and users have both sets of interfaces to choose from and, by making appropriate trade-offs, can choose to mix these interfaces.

V

Virtual Telecommunications Access Method (VTAM). An IBM licensed program that controls communication and the flow of data in an SNA network. It provides single-domain, multiple-domain, and interconnected network capability.

VTAM. See *Virtual Telecommunications Access Method*.

W

WYSIWYG. (1) What-you-see-is-what-you-get. The capability of a text editor to continually display pages exactly as they will be printed. (2) In word processing and desktop publishing, a capability that allows a user

to display page characteristics such as fonts, type size, and format as they will appear when they are printed.

X

XML data. Data that has been identified using Extensible Markup Language (XML) standards from the World Wide Web Consortium. XML does not describe data placement or presentation information. For printing on page printers, a page definition is required to provide the data placement and presentation information. The XML data processed by PSF can be encoded in EBCDIC, ASCII, UTF-8 or UTF-16.

Z

z/OS. An IBM operating system that includes and integrates functions previously provided by many IBM software products (including the MVS and OS/390 operating systems) and:

- Is an open, secure operating system for the IBM zSeries family of enterprise servers
- Complies with industry standards
- Is Year 2000 ready and enabled for network computing and e-business
- Supports technology advances in networking server capability, parallel processing, and object-oriented programming

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Version 3, Release 3.0

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