OS/390

Infoprint Server Introduction

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Infoprint Server Introduction

Contents

Figures

Tables

About This Publication

This publication provides an overview of the following products:

- Infoprint® Server for OS/390® Version 2 Release 8 (5647-A01), hereafter called Infoprint Server
- Infoprint Server Transforms for OS/390 Version 1 Release 1 (5697-F51), a separate IBM® licensed product, hereafter called Infoprint Server Transforms

This overview includes the benefits of Infoprint Server and Infoprint Server Transforms, how you can use them, and how they work.

Who Should Read This Publication

This publication is intended for managers, operators, and system administrators who need to understand the benefits and capabilities of Infoprint Server and Infoprint Server Transforms.

How This Publication is Organized

This publication is organized into chapters to help you obtain the information you need about Infoprint Server and Infoprint Server Transforms. Instead of reading the entire publication, you can read only those chapters that apply to you:

- **Chapter 1. What Infoprint Server Can Do for You** is intended for managers. The chapter describes the overall benefits that Infoprint Server and Infoprint Server Transforms provide.
- **Chapter 2. Using Infoprint Server** is intended for managers, operators, and system administrators. It provides a number of scenarios that show how you can use Infoprint Server and Infoprint Server Transforms in various printing situations.
- **Chapter 3. Understanding the Components of Infoprint Server** is intended for system administrators who want to understand how Infoprint Server and Infoprint Server Transforms work. The chapter describes the component parts of Infoprint Server.

This publication also contains a glossary and a bibliography.

Related Information

"Bibliography" on page 41 lists the publications referred to in this book and publications that contain additional information about related products.

For additional information about Infoprint Server, visit this Web site:
http://www.ibm.com/printers

For additional information about OS/390 and for the latest OS/390 publications and documentation updates that result from authorized program analysis reports (APARs) and program temporary fixes (PTFs), visit this Web site:
http://www.ibm.com/s390/os390

Table 1. Summary of Infoprint Server Publications

Publication	Form number
OS/390 Infoprint Server Introduction Introduces all components of Infoprint Server, including IP PrintWay™, NetSpool™, and Print Interface. Contains printing scenarios that show how you can use Infoprint Server in your installation.	G544-5696
OS/390 Infoprint Server Migration Summarizes the new function in Infoprint Server for OS/390 V2R8, describes required and optional migration tasks to implement the new function in your installation, and describes the Infoprint Server migration program, which helps the administrator convert IP PrintWay, NetSpool, and Print Interface printer information to the format required by Infoprint Server for OS/390 V2R8.	G544-5697
OS/390 Infoprint Server Customization Describes customization tasks for all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. Describes required environment variables, configuration files, and startup procedures.	G544-5694
OS/390 Infoprint Server Operation and Administration Describes operator procedures and administrative tasks for all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. Describes in detail how to create entries and specify printer attributes in the Printer Inventory.	S544-5693
OS/390 Infoprint Server User's Guide Describes how to submit print jobs from remote systems (including Windows® systems), the local OS/390 system, and Virtual Telecommunications Access Method (VTAM®) applications. Describes in detail the **lp**, **lpstat**, **cancel**, **pcl2afp**, **ps2afp**, **pdf2afp**, and **sap2afp** UNIX® commands; the AOPPRINT JCL procedure; OUTPUT JCL parameters supported by IP PrintWay; and the Infoprint Server Windows client.	S544-5692
OS/390 Infoprint Server Messages and Diagnosis Describes messages issued by all components of Infoprint Server, including IP PrintWay, NetSpool, and Print Interface. Also describes how to diagnose and report errors.	G544-5690

Summary of Changes

Summary of Changes for *OS/390 Infoprint Server Introduction*, **G544-5696-01**

This edition contains the following new information:
- "Printing Documents from the Web" on page 10 shows examples of printing with the Server Message Block (SMB) printing protocol and Internet Printing Protocol (IPP).

Technical changes and additions are indicated by a vertical line to the left of the change.

Summary of Changes for *OS/390 Infoprint Server Introduction*, **G544-5696-00**

This publication contains the introductory information previously presented in the following publication:
- *OS/390 Print Server Overview*, G544-5545-00

This publication contains technical additions and changes related to enhancements made in Infoprint Server for OS/390 Version 2 Release 8 (V2R8). Refer to *OS/390 Infoprint Server Migration* for a summary of the V2R8 enhancements.

Chapter 1. What Infoprint Server Can Do for You

Infoprint Server is an optional feature of OS/390 Version 2 Release 8 that uses OS/390 UNIX System Services. This feature is the basis for a total print serving solution for the OS/390 environment. It lets you consolidate your print workload from many servers onto a central OS/390 print server.

Infoprint Server delivers improved efficiency and lower overall printing cost with the flexibility for high-volume, high-speed printing from anywhere in the network. With Infoprint Server, you can reduce the overall cost of printing while improving manageability, data retrievability, and usability.

The IP PrintWay/NetSpool feature available in OS/390 Version 1 Release 3 and Version 1 Release 4 is now a part of Infoprint Server. IP PrintWay allows you fast and reliable access to Transmission Control Protocol/Internet Protocol (TCP/IP)-connected printers. NetSpool automatically directs Virtual Telecommunications Access Method (VTAM) application data to the job entry subsystem (JES) spool without requiring application changes.

This chapter discusses how printing requirements are changing. It explains why print consolidation with OS/390 is the best way to handle printing, describes how Infoprint Server supports printing in the OS/390 environment, and explains how Infoprint Server can benefit you.

How Printing Requirements Are Changing

With the advent of local area networks (LANs) and new information technologies, printing requirements are changing. For example:

Applications need to print to LAN printers and host printers
> Businesses that print statements, such as banking statements, invoices, and bills of materials, need to print both to LAN-attached printers and to higher-volume, host-attached printers. Traditionally, VTAM applications, such as Customer Information Control System (CICS®) and Information Management System (IMS™), have printed such business statements to coaxially-attached Systems Network Architecture (SNA) printers. Now, these VTAM applications need to print to LAN-attached printers or to high-volume host printers.

Workstation users want to print on host printers
> Workstation users want to print documents, such as memos, electronic mail, Web documents, and manuals to LAN-attached Printer Control Language (PCL) and PostScript printers. They also want to print to higher-speed, host-attached printers, such as the IBM Infoprint 60.

Applications need to print and run on the same system
> Many line-of-business applications, such as payroll, accounting, and inventory-control applications, need to print on the same system where the data resides. Whether these applications are OS/390 batch applications or OS/390 UNIX System Services applications, they need to print on host-attached printers.

Companies require more print servers
> Companies with a combination of stand-alone and host-connected LANs

that use a variety of network operating systems and protocols need more print server capacity to meet their distributed printing needs. Adding more print servers increases printing costs.

These requirements introduce new issues:

- How to handle the wide range of printers and formatting options available in an environment and allow users of traditional terminals and distributed workstations to share these printers.
- How to print from host-based applications that have been ported to OS/390 UNIX System Services without reengineering their printing functions.
- How to reduce costs by reducing the number of print servers.

How to Handle the Changing Printing Requirements

Print server consolidation is the best way to handle the changing printing requirements. Why? One central print server in a network is more cost effective than a distributed solution with printers attached to many different LAN servers or local desktop computers. Consolidating onto a central print server lets you use the right printer for specific print jobs. It also lets you balance print workload across all available printers and more easily manage the inventory of printers.

OS/390 Version 2 Release 8 with Infoprint Server lets you consolidate your print workload from many servers to a central OS/390 print server. OS/390 handles high volume printing, logs accounting histories, and provides data security and recovery. With OS/390, you can control host and LAN printing. You do not need to continually upgrade your server so it can handle more print requests.

Figure 1 on page 3 illustrates the printing solutions that Infoprint Server provides. No matter what type of data you want to print (payroll, invoices, Web documents, sales reports), you can use OS/390 batch applications, VTAM applications, applications running on remote workstations, and OS/390 UNIX System Services applications to send print requests to Infoprint Server. Infoprint Server then sends the print requests to OS/390 printers, including local printers and remote printers in a TCP/IP network.
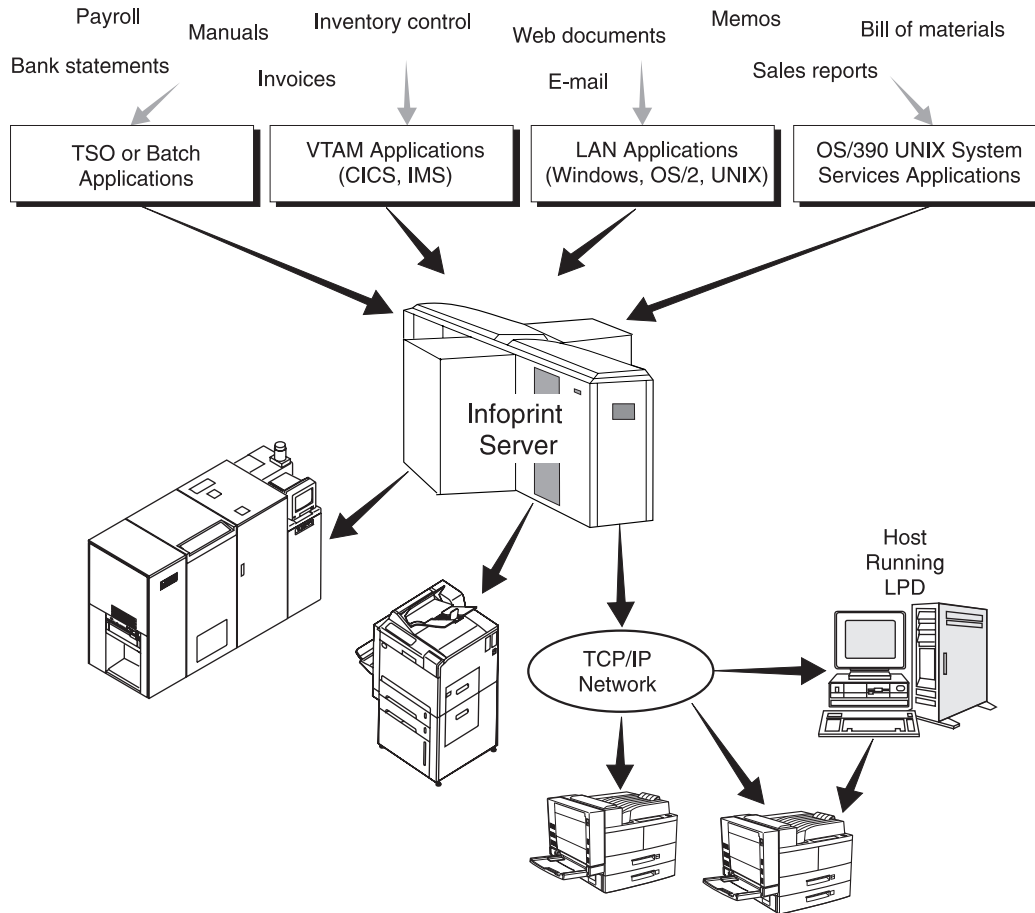
Figure 1. How Infoprint Server Handles Printing Requirements

How Infoprint Server Handles Printing

Infoprint Server uses the OS/390 JES spool, one of the most powerful print spoolers available, to manage the printers on OS/390. In addition to the JES spool's traditional functions of scheduling and recovering print jobs, Infoprint Server has enhanced the use of the JES spool in these ways:

- Users can submit more data streams to the JES spool, specifically:
  - PostScript
  - Printer Control Language (PCL)
  - American National Standard Code for Information Interchange (ASCII)
  - Data from VTAM applications (such as CICS and IMS) that traditionally print on SNA printers

  If you install the optional Infoprint Server Transforms product (5697-F51), users can also submit these data streams:
  - Portable Document Format (PDF)
  - SAP Output Text Format (OTF)
  - SAP Advanced Business Application Programming (ABAP)

- Files on the JES spool can print not only on the traditional array of JES-controlled printers and printers driven by Print Services Facility™ (PSF) for OS/390, but also on printers on a TCP/IP network.

Infoprint Server provides these components that run on the OS/390 host system:

Printer Inventory
>   Provides a single set of printer definitions that are used by the Print Interface, IP PrintWay, NetSpool, and Print Services Facility (PSF) for OS/390.

Print Interface
>   Provides the following functions:
>   - A line printer daemon (LPD) that extends JES2 and JES3 print capabilities to users and application programs in a TCP/IP LAN environment.
>   - Printing support for users and application programs in the OS/390 UNIX System Services environment. Users and applications can print to OS/390-controlled printers, including these printers:
>   - Advanced Function Presentation (AFP™) printers that are attached to OS/390 and that use PSF
>   - LAN-attached ASCII printers that use IP PrintWay
>   - Support for the following Windows printing protocols:
>   - Server Message Block (SMB), used by Windows 95, 98, and Windows NT®
>   - Internet Printing Protocol (IPP), used by Windows 2000

OS/390 UNIX System Services shell printing commands
>   Allow OS/390 UNIX System Services environment applications to submit print, query, and cancel requests to the Print Interface.

NetSpool
>   Directs VTAM application data to the JES spool without requiring application program changes.

IP PrintWay
>   Directs JES2 or JES3 print data from OS/390 to another system's spool or to a printer in the TCP/IP network. IP PrintWay uses the line printer requester/line printer daemon (LPR/LPD) protocol, direct socket printing, or the IPP protocol.

Simple Network Management Protocol (SNMP) subagent
>   Reports the status of printers that do not have their own SNMP subagent to a printer management program, for example, IBM Network Printer Manager for the Web (NPM). NPM allows an operator to monitor printers throughout the network from a Web browser running on any workstation.

NetSpool and IP PrintWay are the strategic replacements for TCP/IP Network Print Facility (NPF) and provide improved usability, performance, capacity, and function.

You can configure Print Interface, NetSpool, and IP PrintWay independently. You determine how you want to configure these Infoprint Server components. For example, if you need to print batch jobs on remote printers, you can configure IP PrintWay. Then, as you need more function, you can configure more components.

Also on the OS/390 host system, the following optional product works like another component of Infoprint Server:

Infoprint Server Transforms
>   Convert jobs in PCL, PostScript, PDF, SAP ABAP, and SAP OTF format to AFP format before printing. You can run transforms as standalone shell

commands from OS/390 UNIX System Services; or you can run them automatically when you submit a job to print.

Infoprint Server also provides a client that runs on the Windows 95, Windows 98, Windows NT, and Windows 2000 operating systems. This client includes the following support:

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

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

OS/390 Printer Port Monitor
Automatically transmits output to the OS/390 Print Interface for printing, allowing users to use familiar print-submission methods from Windows applications. You can use the SMB or IPP printing protocol instead of the OS/390 Printer Port Monitor; but the OS/390 Printer Port Monitor allows you to specify such things as the number of job copies and whether to print on one or both sides of the paper. It can also improve performance.

See "Chapter 2. Using Infoprint Server" on page 7 for examples of the Infoprint Server components that are used in different printing scenarios. For more detailed information about the Infoprint Server components, see "Chapter 3. Understanding the Components of Infoprint Server" on page 17.

Benefits of Using Infoprint Server

Users and application programs in an OS/390 network, including LAN and OS/390 UNIX System Services environments, can take full advantage of Infoprint Server's many benefits, including:

Access All Defined Printers

In today's network environments, printers are often attached to a single workstation or are only available to users of a LAN. Infoprint Server lets you define all of your printers in a centralized repository. Any user in the network can send print jobs from OS/390 and LAN clients to any printer that is defined to Infoprint Server.

Because all components of Infoprint Server and PSF share the printer definitions, you only have to configure each printer in one place.

Handle Print Jobs Effectively

Because print jobs are managed by the OS/390 JES spool, they are secure and recoverable. OS/390 accounting information for print jobs is logged automatically.

Detect and Transform Job Data Streams

The Print Interface automatically detects the data stream for jobs that LAN and OS/390 UNIX System Services clients submit. It can then ensure that the selected printer can print the data stream, thus saving paper and time.

If the Infoprint Server Transforms are installed, and if the printer definition specifies transformation, the Print Interface automatically invokes the appropriate transform command to convert any of the following data streams to AFP format for printing:

- PCL
- PostScript
- PDF
- SAP ABAP
- SAP OTF

Support Common Printer Languages

Infoprint Server provides support for the most commonly used printer languages in the industry, including Postscript, PCL, and AFP or Mixed Object Document Content Architecture-Presentation (MO:DCA-P). With the optional Infoprint Server Transforms, Infoprint Server also supports PDF, SAP OTF, and SAP ABAP. Infoprint Server protects your investment in printer hardware, while providing you with printing enhancements.

Monitor Printer Status

The SNMP subagent reports printer status to a printer management program like the Network Printer Manager, whose graphical user interface (GUI) allows the operator to monitor printers throughout the network. When something goes wrong, the operator can check for more details without leaving the workstation.

Query Job Status

Users of network printing solutions today spend unnecessary time going to the printer to see if their jobs have printed. If they don't find them immediately, they may resubmit the jobs several times without knowing why they haven't printed. With Infoprint Server, users in the LAN and UNIX System Services environments can query the status of their print jobs to find out if a job is processing or is complete. Local system users can simply wait for the server to notify them that the job is complete. The users save time, and the business saves paper.

Create AFP Output from Windows Applications

Because of its capabilities for automatic resource management, error recovery, integrated accounting, and printing from 10 to over 1000 pages per minute without application changes, AFP offers an outstanding solution for high-speed printing. Infoprint Server provides an AFP Printer Driver for Windows 95 and Windows 98 and an AFP Printer Driver for Windows NT and Windows 2000. Therefore, you can print output from any Windows application, such as Lotus® WordPro or Freelance, on any of IBM's AFP printers.

Browse AFP Documents on the Web

Many OS/390 applications generate documents that are formatted for AFP/Intelligent Printer Data Stream™ (IPDS™) printers. You may need to view those documents in an archival system or on a Web server from your desktop. Infoprint Server includes an AFP Viewer plug-in for the Netscape Navigator and Microsoft® Internet Explorer Web browsers so you can view AFP documents from your Web browser. You can also use Infoprint Server to print documents that you are viewing from a Web browser to any defined printer.

Chapter 2. Using Infoprint Server

This chapter describes how you can use Infoprint Server in your particular environment to meet your printing needs. It includes the following scenarios:
- Printing CICS or IMS output data on network printers
- Printing UNIX data on AFP printers
- Printing data from the Web
- Printing data from batch applications to network printers
- Printing AFP documents from Windows environments
- Monitoring printer status

These scenarios are examples of printing situations, but do not represent all situations that exist. Each scenario includes a figure that shows which Infoprint Server components are used. The components are shaded in the figures.

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 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, while taking advantage of the security, accounting, and recovery capabilities of OS/390.

Here is how this company can use the Infoprint Server components to meet its requirements:

1. The CICS or IMS applications submit print requests by using VTAM in the same way as they submit print requests to SNA printers. No changes to the CICS or IMS applications are necessary.

2. The NetSpool component 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 IP PrintWay™ uses to transmit the output to a particular network printer.

3. The IP PrintWay component transmits the output data sets from the JES spool to one or more network printers on the TCP/IP LAN.

Figure 2 shows how Infoprint Server directs the data to network printers.
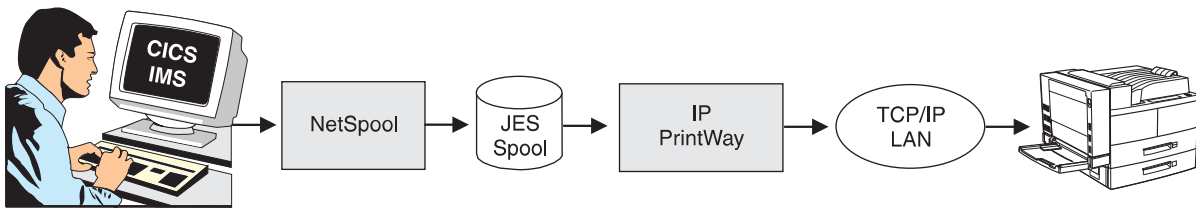
Figure 2. Printing CICS or IMS Output Data on Network Printers

Printing OS/390 UNIX System Services Data on AFP Printers

A mid-size retailer runs UNIX applications that have been ported to OS/390 UNIX System Services. Until now, the applications have printed business statements to PostScript printers controlled by a print server that runs on a UNIX system. Now, the retailer wants to use a higher-speed AFP printer attached to an S/390, such as the IBM 3130 printer, for more efficient printing.

Here is how this retailer can use the Infoprint Server components and the Infoprint Server Transforms to meet its requirements:

1. The UNIX user logs onto OS/390 UNIX System Services by using the **rlogin** function.
2. Using the OS/390 UNIX System Services printing commands provided with Infoprint Server, the UNIX applications print directly to the Print Interface component.
3. The Print Interface component automatically calls the Infoprint Server Transforms to convert PostScript or PDF documents to AFP format.
4. The Print Interface component creates output data sets on the JES spool.
5. PSF for OS/390 selects the output data sets from the JES spool and prints them on an AFP printer. If the retailer has more than one AFP printer, the first available printer can print the data sets.

Figure 3 shows how Infoprint Server directs OS/390 UNIX System Services data to AFP printers.
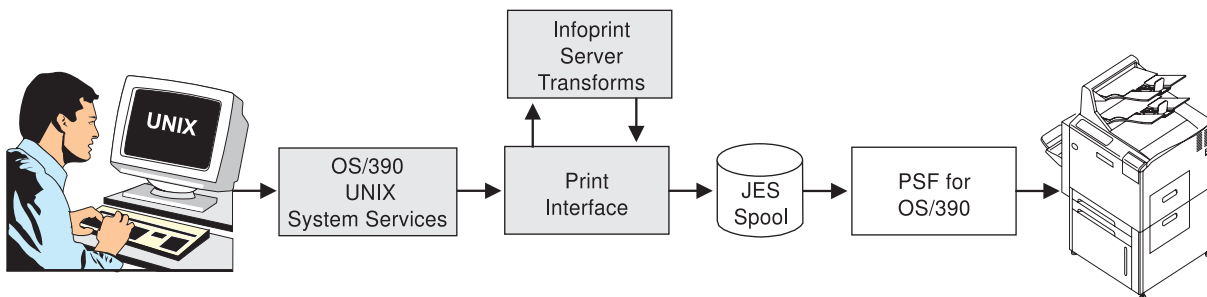
Figure 3. Printing OS/390 UNIX System Services Data on AFP Printers

> **Note:** Users can also submit print requests from UNIX workstations by using the **lpr** command.

Printing Documents from the Web

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

These three scenarios show how this company can use the Infoprint Server components to meet its requirements:

- Using Windows 95 or Windows NT and the SMB printing protocol
- Using Windows 95 or Windows NT and the OS/390 Printer Port Monitor
- Using Windows 2000 and the IPP printing protocol

Using Windows 95 or Windows NT and the SMB Printing Protocol

1. From a Windows 95 or Windows NT workstation, a user views a document from the Web in a browser, such as Netscape Navigator. If the document is in AFP format, the AFP Viewer plug-in displays the document.

2. The user submits the document for printing using the standard print-submission method provided with the browser or viewer. The user selects an OS/390 printer, which might be a PostScript printer or an AFP printer. The printer driver associated with the printer creates an output file in the required format. For example, the AFP Printer Driver creates an output file in AFP format for printing on AFP printers.

3. The SMB printing protocol included in Windows 95 and Windows NT 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 JES output parameters defined by the administrator. The JES output parameters specify routing information that PSF for OS/390 and IP PrintWay can use to transmit the output to a printer. They can also specify how the job is printed.

5. If the selected printer is a remote PostScript printer, the IP PrintWay component transmits the output data set to the PostScript printer on the TCP/IP LAN. If the selected printer is an AFP printer, PSF for OS/390 prints the data set on the AFP printer.

Figure 4 shows how Infoprint Server directs data from the Web to PostScript or AFP printers.
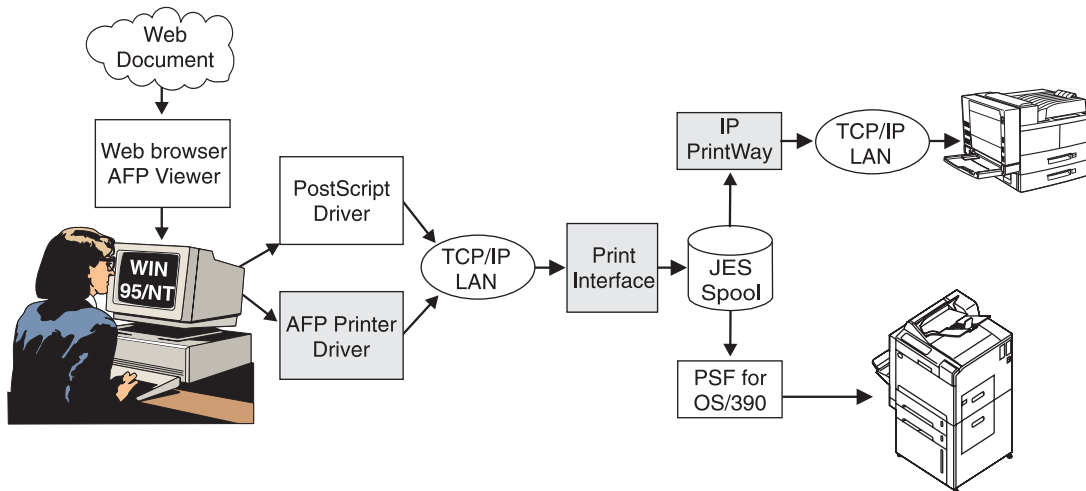
Figure 4. Printing Documents from the Web with the SMB Printing Protocol

Using Windows 95 or Windows NT and the OS/390 Printer Port Monitor

In order to improve performance, some users install the OS/390 Printer Port Monitor.

1. From a Windows 95 or Windows NT workstation, a user views a document from the Web in a browser, such as Netscape Navigator. If the document is in AFP format, the AFP Viewer plug-in displays the document.

2. The user submits the document for printing using the standard print-submission method provided with the browser or viewer. The user selects an OS/390 printer, which might be a PostScript printer or an AFP printer, and specifies job attributes in the OS/390 Printer Port Monitor dialog. The printer driver associated with the printer creates an output file in the required format. For example, the AFP Printer Driver creates an output file in AFP format for printing on AFP printers.

3. The OS/390 Printer Port Monitor 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 the JES output parameters defined by the administrator and the JES output parameters that correspond to the job attributes specified by the user. The JES output parameters specify routing information that PSF for OS/390 and IP PrintWay can use to transmit the output to a printer. They can also specify how the job is printed.

5. If the selected printer is a remote PostScript printer, the IP PrintWay component transmits the output data set to the PostScript printer on the TCP/IP LAN. If the selected printer is an AFP printer, PSF for OS/390 prints the data set on the AFP printer.

Figure 5 shows how Infoprint Server directs data from the Web to PostScript or AFP printers.
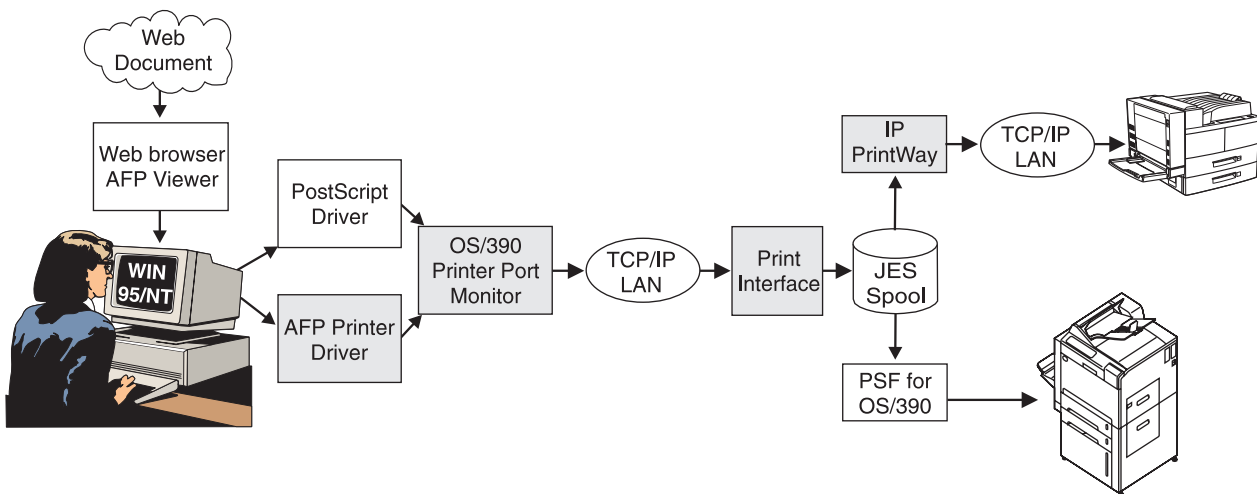
Figure 5. Printing Documents from the Web with the OS/390 Printer Port Monitor

Using Windows 2000 and the IPP Printing Protocol

The company upgrades to Windows 2000 and installs a printer that supports the IPP printing protocol.

1. From a Windows 2000 workstation, a user views a document from the Web in a browser, such as Netscape Navigator. If the document is in AFP format, the AFP Viewer plug-in displays the document.

2. The user submits the document for printing using the standard print-submission method provided with the browser or viewer. The user selects an OS/390 printer, which might be a PostScript printer or an AFP printer. The printer driver associated with the printer creates an output file in the required format. For example, the AFP Printer Driver creates an output file in AFP format for printing on AFP printers.

3. The IPP printing protocol included in Windows 2000 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 JES output parameters defined by the administrator. The JES output parameters specify routing information that PSF for OS/390 and IP PrintWay can use to transmit the output to a printer. They can also specify how the job is printed.

5. If the selected printer is a remote PostScript printer, the IP PrintWay component transmits the output data set to the PostScript printer on the TCP/IP LAN. If the printer supports IPP, the IPP client in IP PrintWay communicates with the printer's IPP server.

   If the selected printer is an AFP printer, PSF for OS/390 prints the data set on the AFP printer.

Figure 6 shows how Infoprint Server directs data from the Web to PostScript or AFP printers.
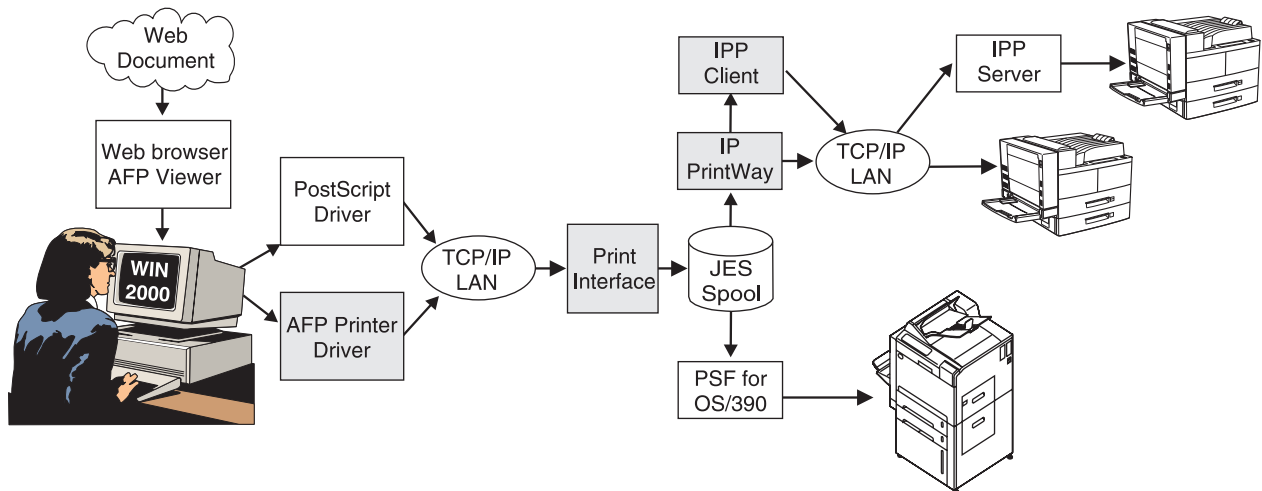
Figure 6. Printing Documents from the Web with the IPP Printing Protocol

Printing from Batch Applications to Network Printers

A financial institution wants to use OS/390 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.

Here is how this financial institution can use the Infoprint Server components to meet its requirements:

1. The financial institution uses OS/390 to generate statements, segments the statements by branch office, and stores them in separate files for printing.
2. An application uses job control language (JCL) to submit the printable files directly to the JES spool.
3. The IP PrintWay component transmits the files from the JES spool to branch office printers on the TCP/IP LAN.

Figure 7 shows how Infoprint Server directs batch data to network printers.
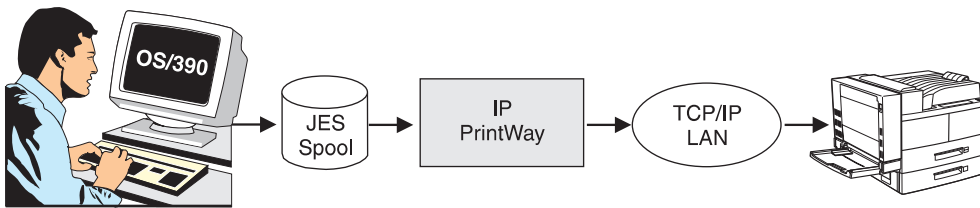
Figure 7. Printing from Batch Applications to Network Printers

Creating and Printing AFP Documents from Windows

A large production printing company uses a word processor on Windows workstations to prepare its manuals. It then uses IBM AFP printers on the OS/390 system, such as the Infoprint 60 or the Infoprint 4000 printer, to print the manuals.

Here is how this company can use Infoprint Server to develop and print from a Windows environment:

1. At a Windows workstation, a writer uses a word processor to prepare a manual. The writer then uses the standard print-submission method provided with the word processor to submit the manual to an OS/390 AFP printer. The AFP Printer Driver associated with the printer creates an output file in AFP format.

2. The OS/390 Printer Port Monitor automatically transmits the output file across the TCP/IP LAN to the Print Interface component.

3. The Print Interface component creates output data sets on the JES spool.

4. PSF for OS/390 selects the print job from the JES spool and directs it to the selected AFP printer.

Figure 8 shows how Infoprint Server lets a user create and print AFP documents from Windows.
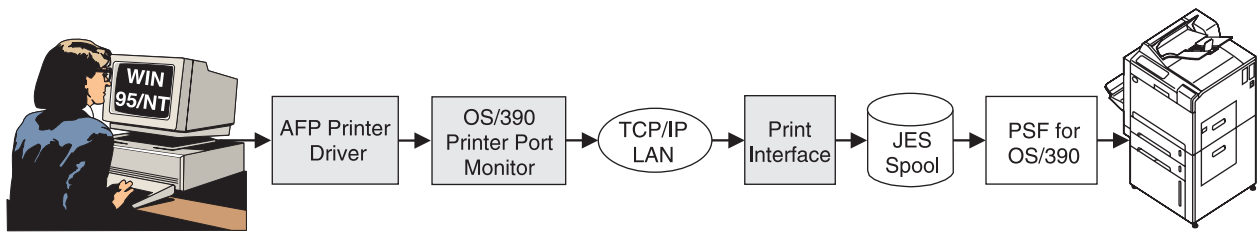
Figure 8. Creating and Printing AFP Documents from Windows

Monitoring Printer Status

A university engineering department maintains a network of many different computers and printers for a variety of projects. To prevent damage to the printers, they are locked. Only authorized key operators can add toner or clear a paper jam.

Here is how this department can use Infoprint Server and NPM to monitor printer status:

1. A sheet of paper gets caught in a PSF printer. Because the printer is defined in the Printer Inventory, PSF for OS/390 is able to report the paper jam to the SNMP subagent immediately.

2. The SNMP subagent reports the paper jam to NPM.

3. In the NPM GUI running in a web browser on the key operator's Windows workstation, the printer icon turns red to show that something is wrong with the printer.

4. The key operator clicks on the printer icon to view details about the problem; then goes to the printer and clears the paper jam.

5. PSF for OS/390 reports to the SNMP subagent that the problem has been corrected. The SNMP subagent transmits this information to NPM.

6. Meanwhile, a researcher compiles a report at a UNIX workstation. The researcher then starts a Web browser and checks the NPM GUI to see if the PSF printer is available. The printer icon is now normal.

7. Satisfied that the printer is running, the researcher submits the report to print.

Figure 9 shows how Infoprint Server lets users monitor printer status.
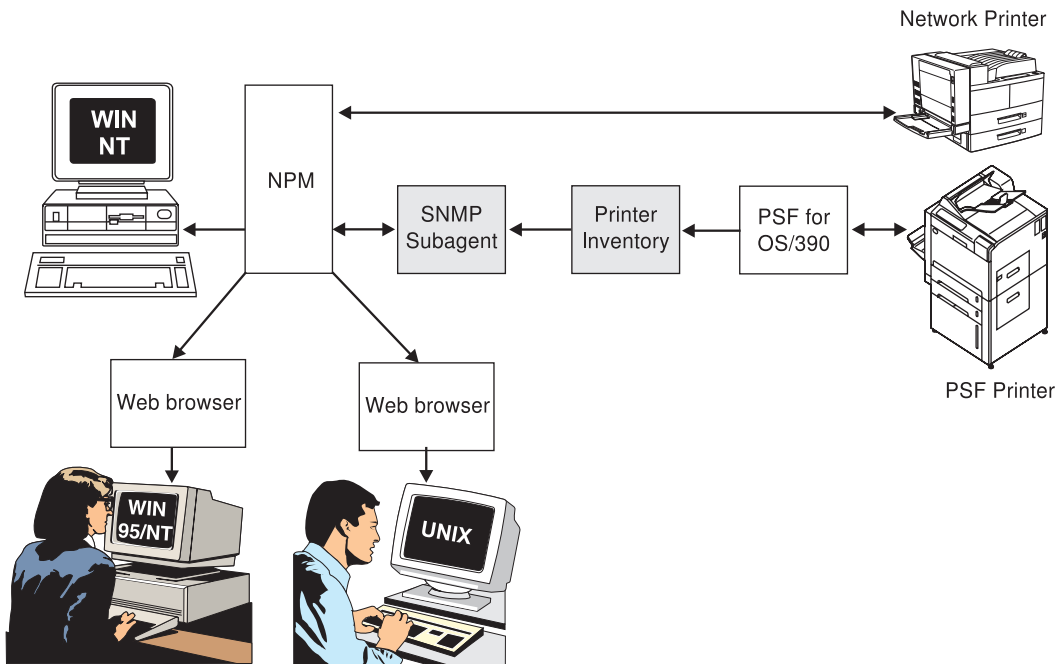
Figure 9. Monitoring Printer Status

Chapter 3. Understanding the Components of Infoprint Server

Figure 10 shows the components of Infoprint Server and how they fit into your system. The components of Infoprint Server are shaded.
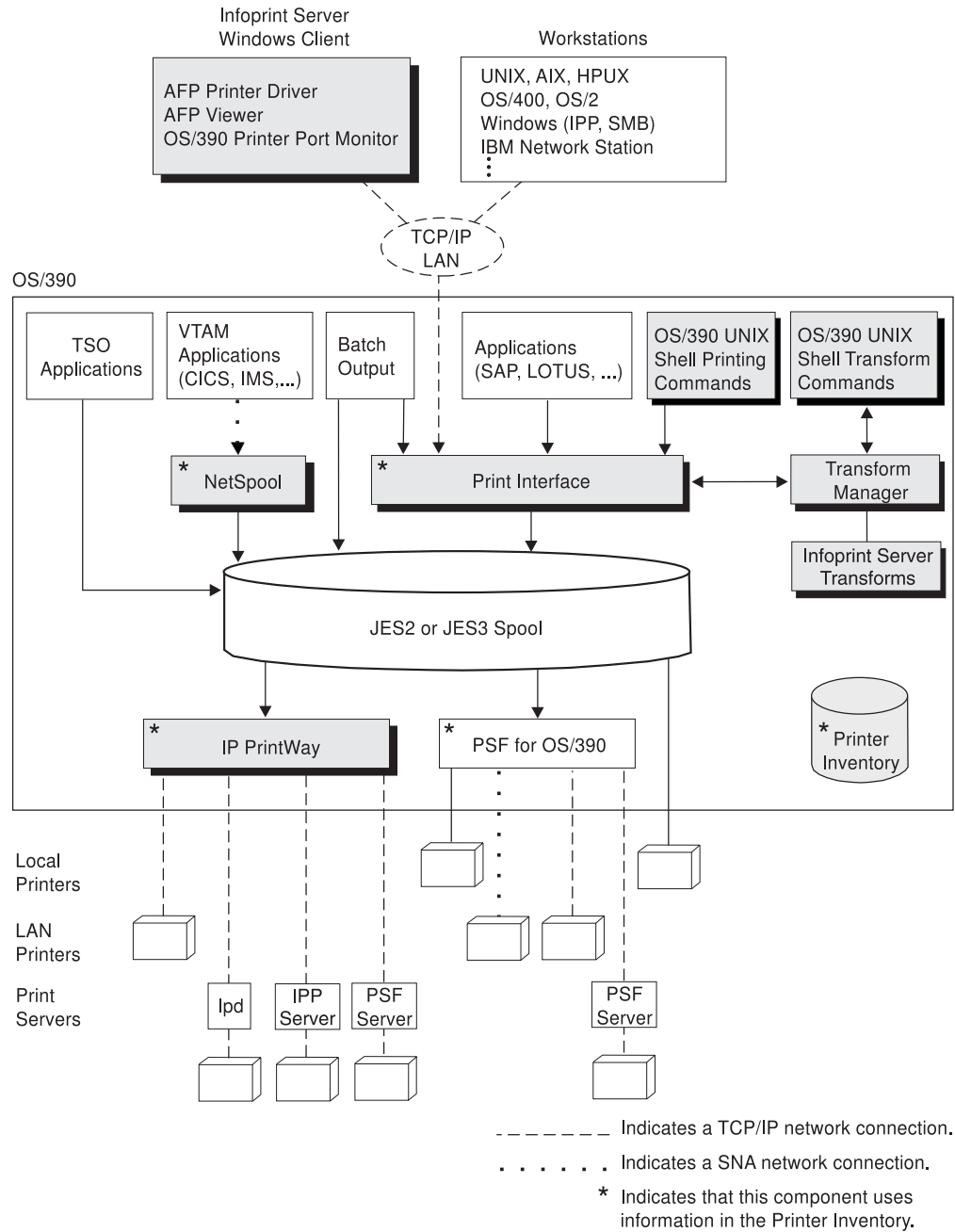
Figure 10. Infoprint Server Components. Not shown: SNMP subagent

The Printer Inventory

The Printer Inventory, a set of files maintained by the system administrator, contains information about the OS/390 printers, local printers, and remote printers. In one central location, it contains all the information needed to perform the following tasks:

- Validate print requests
- Allocate data sets on the JES spool
- Direct data sets to printers

The Printer Inventory is common to the Print Interface, IP PrintWay, NetSpool, and PSF for OS/390. The system administrator can define a printer once for all components of Infoprint Server. With some additional information, PSF can use the same definition.

The Print Interface

The Print Interface component of Infoprint Server runs on the OS/390 system. It provides an LPD that receives print requests from remote workstations that have TCP/IP access and from the OS/390 UNIX System Services shell printing commands on the local OS/390 system.

The Print Interface performs these functions:

- It creates an output data set on the JES spool for each document to be printed. The Print Interface maps the printing options specified on **lp** commands and some of the printing options specified on **lpr** commands to JES output parameters. These parameters are the same parameters that you can specify on JCL statements when you submit batch jobs.
- It responds to query requests with the status of the output data set on the JES spool or a list of the printers known to the Print Interface.
- It removes data sets from the JES spool. The data sets must not yet have been selected for printing.

  Note: For security reasons, the Print Interface does not allow users to cancel print requests from remote systems.

After the Print Interface creates output data sets on the JES spool, the data sets can be printed in any of these ways:

- JES or PSF for OS/390 can print the data sets.
- JES or PSF for OS/390 can transmit the data sets to another location for printing.
- IP PrintWay can transmit the data sets to a remote printer in your TCP/IP network.

Some of the benefits that the Print Interface provides are:

- Printing of any data format that the printer supports

  The Print Interface allows users to submit print requests with any data format that the printer supports. These formats include, but are not limited to, PCL, PostScript, MO:DCA-P, S/390 line data, and text. The Print Interface detects the data format.

- Validation of print requests

Before accepting print requests, the Print Interface validates, with some exceptions, that a document can print as requested on the selected printer. For example, the Print Interface rejects a document with a data format that the printer does not support.

- Notification of completion

  The Print Interface notifies users on the local OS/390 system when processing of a document is complete.

- Identification of printed output

  The Print Interface maintains the user ID of the job submitter for printing on separator pages. Both PSF for OS/390 and IP PrintWay allow installations to write an exit to print separator pages.

- Double-byte character set (DBCS) support

  The Print Interface converts DBCS data from one code page to another before writing the data to the JES spool.

- IPP server

  The Print Interface includes an IPP server to support printing from Windows 2000. The IPP server allows Windows 2000 users to print to OS/390 printers without installing the OS/390 Printer Port Monitor.

- SMB support

  The Print Interface includes support for the SMB print protocol, which is used by Windows 95, 98, and Windows NT. SMB support allows Windows users to print to OS/390 printers without installing the OS/390 Printer Port Monitor.

OS/390 UNIX System Services Shell Printing Commands

The Print Interface includes enhanced OS/390 UNIX System Services shell printing commands, which provide more function than the printing commands available without Infoprint Server. These enhanced commands adhere to the XPG4.2 standard, to facilitate the porting of UNIX applications to OS/390 UNIX System Services.

lp command

> The **lp** command sends files for printing to the Print Interface that runs on the local OS/390 system. The files can be HFS files or non-HFS data sets, such as sequential data sets and partitioned data sets.

lpstat command

> The **lpstat** command queries the status of print jobs. It also queries the names, locations, and descriptions of printers that the administrator has defined to the Print Interface.

cancel command

> The **cancel** command cancels print requests, provided that the data set allocated on the JES spool has not yet been selected for printing.

Some of the benefits these commands provide are:

- Notification of completion

  These commands allow users to request notification when processing of the data set on the JES spool completes. Notification can be sent to the terminal or can use the electronic mail facility.

- Specifying AFP printing options

  On the **lp** command, users can request printing options for printing on AFP printers. For example, users can specify the names and locations of user-defined form definitions and page definitions.

- Specifying printing options in a file

  To make specification of printing options easier, the **lp** command allows users to specify the printing options in a file and simply name the file on the command.

- Specifying printing options in an environment variable

  The **lp** command also allows users to specify printing options in an environment variable. Options specified in a variable take effect automatically. The user can override these options on the command line or in a file.

- Printing on remote printers that are not defined in the Printer Inventory

  On the **lp** command, users can specify routing information, such as the Internet Protocol (IP) address or host name and the print queue name, for remote printers in the TCP/IP network. This allows users to print on remote printers that the administrator has not defined in the Printer Inventory.

The Infoprint Server Transforms

The Infoprint Server Transforms are an optional product designed to work with Infoprint Server. This product provides filters that transform files in any of the following formats to AFP files for printing on AFP printers:

- PCL
- PDF
- PostScript
- SAP ABAP
- SAP OTF

These transforms can run automatically when users submit jobs to print, or users can run them with the following OS/390 UNIX System Services shell commands:

pcl2afp command
  The **pcl2afp** command transforms a PCL file.

ps2afp (pdf2afp) command
  The **ps2afp** command and its alias, the **pdf2afp** command, transform a PostScript or PDF file.

sap2afp command
  The **sap2afp** command transforms a SAP ABAP or SAP OTF Version 1 or Version 2 file.

Some of the benefits that the Infoprint Server Transforms provide are:

- Automatic transformation

  When a user submits a job through the Print Interface to a printer that is configured for transformation, the appropriate transform runs automatically.

- Specifying transform options

  Users can specify options on the transform commands or pass them to the transform when they submit the job. For example, users can specify that the output from the transform should include only selected pages.

NetSpool

NetSpool intercepts print data from VTAM applications, such as CICS and IMS. NetSpool converts the data into S/390 line data and creates output data sets on the JES2 or JES3 spool. JES or PSF for OS/390 can print the output data sets or transmit them to another location for printing. Alternatively, IP PrintWay can transmit the data sets to a remote printer in your TCP/IP network.

NetSpool supports the following data streams:
- SNA character string (SCS) data over a logical unit (LU) type 1 session
- 3270 data over an LU type 0 or type 3 session
- Binary data over an LU type 0, type 1, or type 3 session

You can configure NetSpool so that you do not need to change existing VTAM applications. That is, existing VTAM applications send print requests to NetSpool in the same manner as they currently send print requests to SNA network printers.

Some of the benefits NetSpool provides are:
- Data integrity

  By placing VTAM application output on the JES2 or JES3 spool, NetSpool lets you take advantage of the security, checkpoint and restart, and reprint capabilities that JES provides.
- Printer sharing

  NetSpool allows multiple VTAM applications to direct output to the JES spool for simultaneous printing on a single shared printer.
- Print broadcasting

  NetSpool allows a single VTAM application to simultaneously direct output to the JES spool for printing on multiple printers.
- AFP formatting

  Users can specify AFP parameters, such as page definition, form definition, and character sets, to take advantage of AFP formatting when printing on AFP printers.
- DBCS support

  NetSpool supports DBCS data in both SCS and 3270 data streams.
- Transparent-data support

  NetSpool supports transparent data in SCS data streams and provides exits for adding and changing transparent data.

IP PrintWay

IP PrintWay transmits output data sets from JES2 or JES3 to remote printers or to host systems in your TCP/IP network. A print server can be running on the host system. The remote printer or host system must support either the LPR/LPD protocol, the IPP protocol, or direct socket printing.

Some of the benefits IP PrintWay provides are:

- JCL parameters to route data sets

  A user submitting an OS/390 batch job can specify routing information in JCL. For example, the user can specify the name of the remote print queue or the port number, and the IP address or the host name of the printer's host system.

- Data integrity

  IP PrintWay can retry the transmission of data sets to remote printers. It can also verify that the transmission of data is successful before deleting data sets from the JES spool. (Even though transmission is successful, the data set may not yet have printed.)

  In addition, IP PrintWay can retain data sets on the JES spool for a specified amount of time after either successful or failed transmissions.

- Distribution of data to a workstation

  Transmitting data sets to a print queue on a workstation allows users to use workstation applications not only to print data, but also to view, archive, or fax the data.

- Accounting

  For each data set processed, IP PrintWay writes a System Management Facility (SMF) type-6 record, which includes the number of bytes transmitted and the IP address of the target system.

- Installation exits

  IP PrintWay allows system programmers to write exits to customize IP PrintWay processing. For example, an exit can change routing information, add separator pages, update SMF accounting records, and notify users of processing events.

- DBCS support

  IP PrintWay supports conversion of DBCS data from extended binary-coded decimal interchange code (EBCDIC) to ASCII before transmission to a remote printer for printing.

The SNMP Subagent

The SNMP subagent reports the status of printers that do not have their own SNMP subagent to a printer management program, for example, NPM.

The SNMP subagent allows an operator to use the NPM GUI to monitor the status of printers throughout the system from a Web browser running on a single workstation. When something goes wrong, the interface permits the operator to check for details about any printer. Users can also check the status of printers before they submit jobs.

The Network Printer Manager server requires Windows NT. The GUI can run on any workstation with a Web browser that supports Java® 1.1, for example, Netscape Navigator (in Netscape Communicator 4.51) or Microsoft Internet Explorer 5.0.

Note: NPM is designed to support about 15 printers. Defining more printers may cause poor performance.

Windows Workstation Support

Infoprint Server support for Windows 95, Windows 98, Windows NT, and Windows 2000 allows Windows users to print documents on AFP printers and other OS/390 printers.

AFP Printer Driver for Windows
The AFP Printer Driver creates output files in AFP format, so that Windows users can print on AFP printers. The AFP Printer Driver can create output files that contain documents, overlays, or page segments. It can also create inline form definitions for printing documents with special options, such as printing on both sides of the paper.

Refer to *PSF for OS/390: User's Guide* for information about overlays and page segments.

AFP Viewer plug-in for Windows
The AFP Viewer plug-in allows Windows users to view files in AFP format using an Internet browser. Users can also print from the AFP Viewer plug-in.

OS/390 Printer Port Monitor for Windows
The OS/390 Printer Port Monitor sends files submitted for printing from Windows applications to the Print Interface component of the OS/390 host system. The OS/390 Printer Port Monitor allows users to print from Windows applications that support printing to any printer that the administrator has defined to the Print Interface.

Some of the benefits the AFP Printer Driver, AFP Viewer plug-in, and OS/390 Printer Port Monitor provide are:

- Printing on AFP printers

  The AFP Printer Driver allows Windows users to print documents, including Web-based documents in other formats, on AFP printers.

- Printing using standard Windows printing dialogs

  The OS/390 Printer Port Monitor allows Windows users to print to any OS/390 printer defined to the Print Interface, using standard print-submission methods from Windows applications that support printing.

  The Print Interface includes support for the following Windows print protocols:

– SMB, used by Windows 95, Windows 98, and Windows NT

– IPP, used by Windows 2000

Therefore, Windows users can use standard print-submission methods to print to OS/390 printers without installing the OS/390 Printer Port Monitor. However, installing the OS/390 Printer Port Monitor may improve performance.

- Viewing AFP documents

  The AFP Viewer plug-in allows Windows users to view AFP documents, such as documents downloaded from the OS/390 system or retrieved from the Web.

- Printing AFP documents on non-AFP printers

  The AFP Viewer plug-in allows Windows users to view AFP documents and then print them on non-AFP printers, as well as to AFP printers.

The AFP Printer Driver, AFP Viewer plug-in, and OS/390 Printer Port Monitor require Windows 95, Windows 98, Windows NT (Version 3.51 or higher), or Windows 2000. The Microsoft TCP/IP protocol must be configured and operational.

The AFP Viewer plug-in also requires Netscape Navigator (Version 3.01 or later) or Microsoft Internet Explorer (Version 3.01, Level 4.70.1215 or later).

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Year 2000 Ready

Infoprint Server for OS/390 does not have date dependencies and is therefore Year 2000 ready. When used in accordance with its associated documentation, Infoprint Server 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 Infoprint Server (including software, hardware, and firmware) properly exchange accurate data with it.

Glossary

Sources

This glossary defines technical terms and abbreviations used in Infoprint Server documentation. If you do not find the term you are looking for, see the index of this publication or view *IBM Dictionary of Computing,*, located at: http://www.ibm.com/networking/nsg/nsgmain.htm

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Definitions that are specific to IBM products are so labeled; for example, "In TCP/IP," or "In Infoprint Server."

References

The following cross-references are used in this glossary:

Contrast with. This refers to a term that has an opposite or substantively different meaning.

See. This refers to multiple-word terms in which this term appears.

See also. This refers to related terms that have similar, but not synonymous, meanings.

Synonym for. This appears in the commentary of a less desirable or less specific term and identifies the preferred term that has the same meaning.

Synonymous with. This appears in the commentary of a preferred term and identifies less desirable or less specific terms that have the same meaning.

Numerics

3270 data stream. Data transferred from or to an allocated primary or tertiary device, or to the host system, as a continuous stream of data and 3270 Information Display System control elements in character form.

A

abend. Termination of a task before its completion because of an error condition that cannot be resolved by recovery facilities while the task is executing.

ACB. Access method control block.

access method control block (ACB). A control block that links an application program to VTAM.

ACIF. (1) AFP conversion and indexing facility. (2) A PSF utility program that converts a print file into AFP, MO:DCA-P, creates an index file for input data, and collects resources used by an AFP document into a separate file.

Advanced Function Presentation (AFP). A set of licensed programs, together with user applications, that use the all-points-addressable concept to print on presentation devices. AFP includes creating, formatting, archiving, retrieving, viewing, distributing, and printing information.

AFP. Advanced Function Presentation.

AFP Printer Driver for Windows. A component of Infoprint Server for OS/390 that runs on a Windows 95 or Windows NT workstation and creates output in AFP format, for printing on AFP printers.

AFP Viewer plug-in for Windows. A component of Infoprint Server for OS/390 that runs on a Windows 95 or Windows NT workstation and allows you to view files in AFP format.

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

alphanumeric character. A letter or a number.

ASCII (American Standard Code for Information Interchange). 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. The ASCII set consists of control characters and graphic characters. (A)

Note: IBM has defined an extension to ASCII code (characters 128–255).

B

banner page. A page printed before the data set is printed.

binary data. (1) Any data not intended for direct human reading. Binary data may contain unprintable characters, outside the range of text characters. (2) A type of data consisting of numeric values stored in bit patterns of 0s and 1s. Binary data can cause a large number to be placed in a smaller space of storage.

BIND. In SNA, a request to activate a session between two logical units (LUs).

broadcast. (1) Transmission of the same data to all destinations. (T) (2) Simultaneous transmission of data to more than one destination.

buffer. A portion of storage used to hold input or output data temporarily.

burst. To separate continuous-forms paper into single sheets.

C

carriage control character. An optional character in an input data record that specifies a write, space, or skip operation.

carriage return (CR). (1) A keystroke generally indicating the end of a command line. (2) In text data, the action that indicates to continue printing at the left margin of the next line. (3) A character that will cause printing to start at the beginning of the same physical line in which the carriage return occurred.

case-sensitive. Pertaining to the ability to distinguish between uppercase and lowercase letters.

catalog. (1) A directory of files and libraries, with reference to their locations. (2) To enter information about a file or a library into a catalog. (3) The collection of all data set indexes that are used by the control program to locate a volume containing a specific data set.

CICS. Customer Information Control System.

client. A functional unit that receives shared services from a server. See also *client-server*.

client-server. In TCP/IP, the model of interaction in distributed data processing in which a program at one site sends a request to a program at another site and awaits a response. The requesting program is called a client; the answering program is called a server.

code page. (1) A table showing codes assigned to character sets. (2) An assignment of graphic characters and control function meanings to all code points. (3) Arrays of code points representing characters that establish ordinal sequence (numeric order) of characters. (4) A particular assignment of hexadecimal identifiers to graphic elements.

code point. A 1-byte code representing one of 256 potential characters.

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

connection. In TCP/IP, the path between two protocol applications that provides reliable data stream delivery service. In Internet communications, a connection extends from a TCP application on one system to a TCP application on another system.

copy group. One or more copies of a page of paper. Each copy can have modifications, such as text suppression, page position, forms flash, and overlays.

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.

D

daemon. A program that runs unattended to perform a standard service. Some daemons are triggered automatically to perform their task; others operate periodically.

data set. The major unit of data storage and retrieval, consisting of a collection of data in one of several prescribed arrangements and described by control information to which the system has access.

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.

DBCS. Double-byte character set.

default. A value, attribute, or option that is assumed when no alternative is specified by the user.

directory. (1) A type of file containing the names and controlling information for other files or other directories. Directories can also contain subdirectories, which can contain subdirectories of their own. (2) A file that contains directory entries. No two directory entries in the same directory can have the same name. (POSIX.1). (3) A file that points to files and to other directories. (4) An index used by a control program to locate blocks of data that are stored in separate areas of a data set in direct access storage.

DLL filter. A filter that provides one or more of these functions in a dynamic load library - init(), prolog(), process(), epilog(), and term(). See **cfilter.h** and **cfilter.c** in the **/usr/lpp/Printsrv/samples/** directory for more information. See also filter. Contrast with DLL filter.

dotted decimal notation. The syntactical representation for a 32-bit integer that consists of four 8-bit numbers written in base 10 with periods (dots) separating them. It is used to represent IP addresses.

double-byte character set (DBCS). A set of characters in which each character is represented by a two-bytes code. Languages such as Japanese, Chinese, and Korean, which contain more symbols than can be represented by 256 code points, require double-byte character sets. Because each character requires two bytes, the typing, display, and printing of DBCS characters requires hardware and programs that support DBCS. Contrast with *single-byte character set*.

download. To transfer data from one computer for use on another one. Typically, users download from a larger computer to a diskette or fixed disk on a smaller computer or from a system unit to an adapter.

Download for OS/390. A feature of PSF for OS/390 that allows the PSF program to automatically send data sets from the JES spool, without formatting them, directly to either Infoprint Manager for AIX or EDMSuite OnDemand, using the TCP/IP protocol. Infoprint Manager for AIX and EDMSuite OnDemand servers receive the data sets into files, which can be automatically formatted and printed by Infoprint Manager for AIX or loaded into EDMSuite OnDemand.

drain. An operator action to halt the flow of jobs to a printer, usually to stop the printer or to change print options.

E

EBCDIC. Extended binary-coded decimal interchange code. A coded character set consisting of 8-bit coded characters. (A)

encryption. In computer security, the process of transforming data into an unintelligible form in such a way that the original data either cannot be obtained or can be obtained only by using a decryption process.

environment variable. (1) A name associated with a string of characters, made available to the programs that you run. (2) A variable that describes the operating environment of the process and typically includes information about the home directory, command search path, the terminal in use, and the current time zone. (3) A variable included in the current software environment that is available to any called program that requests it.

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 pathname. (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 may be defined by the implementation. (POSIX.1) In the OS/390 UNIX System Services implementation, the file system does not support block special files, but it does support symbolic link files. (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.

file system. (1) A collection of files and directories. (2) The collection of files and file management structures on a physical or logical mass storage device, such as a disk or disk partition. A single device can contain several file systems. (3) A mountable subtree of the directory hierarchy. (4) A collection of files and certain of their attributes. A file system provides a name space for file serial numbers referring to those files. (POSIX.1).

filter. In Print Interface, a program that can add, delete, or modify input data before Print Interface writes the data to the JES spool. Print Interface provides support for two types of filter programs: DLL filters and UNIX filters. See also DLL filter and UNIX filter.

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.

form definition. A resource used by PSF that defines the characteristics of the form, which includes such functions as 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.

FSA. Functional subsystem application.

FSS. Functional subsystem.

functional subsystem (FSS). An address space uniquely identified as performing a specific function related to the JES.

functional subsystem application (FSA). The functional application program managed by the functional subsystem.

H

hexadecimal. (1) Pertaining to a selection, choice, or condition that has 16 possible different values or states. (I) (2) Pertaining to a fixed-radix numeration system, with radix of 16. (I) (3) Pertaining to a system of numbers to the base 16; hexadecimal digits range from 0 through 9 and A through F, where A represents 10 and F represents 15.

hiperspace. The space used for paging by the OS/390 operating system.

HFS data set. A hierarchical file system data set, which is used to store, and is essentially identified with, a file system.

home directory. (1) The current directory associated with the user at the time of login. (POSIX.2) (2) A directory associated with an individual user. (3) The user's current directory on login or after issuing the **cd** command with no argument.

host. In the Internet suite of protocols, an end system. The end system can be any system; it does not have to be a mainframe.

host address. See *IP address*.

host name. In the Internet suite of protocols, the name given to a machine. Sometimes, "host name" is used to mean *fully qualified domain name*; other times, it is used to mean the most specific subname of a fully qualified domain name. For example, if *boulder.vnet.ibm.com* is the fully qualified domain name, either of the following may be considered the host name:
- boulder.vnet.ibm.com
- boulder

I

IMS. Information Management System

Infoprint Server for OS/390. An element of OS/390 V2R8 and higher that supports printing on OS/390 printers, including local printers and remote printers in a TCP/IP network. Infoprint Server lets users submit print requests from remote workstations in a TCP/IP network, from OS/390 UNIX System Services applications, from batch applications, and from VTAM applications, such as CICS or IMS applications. Infoprint Server consists of the following components:
- IP PrintWay
- NetSpool
- Print Interface
- Printer Inventory Manager
- Transform Manager and Infoprint Server Transforms for OS/390
- SNMP subagent
- Windows client
  - IBM AFP Printer Driver for Windows

– IBM AFP Viewer plug-in for Windows
– OS/390 Printer Port Monitor for Windows

Information Management System (IMS). A database/data communication system that can manage complex databases and networks.

inline resource. A resource contained in the print data set.

Internet. A wide area network connecting thousands of disparate networks in industry, education, government, and research. The Internet network uses TCP/IP as the protocol for transmitting information.

Internet Printing Protocol (IPP). An application-level protocol that enables distributed printing on the Internet. IPP uses a client/server architecture and defines the interactions between IPP clients (typically work-stations) and IPP servers.

Internet Protocol (IP). A protocol used to route data from its source to its destination in an Internet environment.

IP. 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.

IPP. Internet Printing Protocol.

IP PrintWay. A component of Infoprint Server for OS/390 that transmits output data sets from the JES spool to printers in a TCP/IP network. Also called PrintWay.

J

JCL. Job control language.

JES. Job entry subsystem.

JES2. An OS/390 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 OS/390 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.

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 OS/390 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.

K

Kanji. A Japanese ideographic alphabet. In Kanji, each character is represented by 2 bytes.

kilobyte (KB). (1) For processor storage, real and virtual storage, and channel volume, 1024 bits. (2) For disk storage capacity and communications volume, 1000 bytes.

L

LAN. local area network.

line data. Data prepared for printing on a line printer such as a 3800 Model 1 Printing Subsystem. Line data is usually characterized by carriage-control characters and table reference characters. Contrast with *MO:DCA-P data*.

line printer daemon (LPD). The printer server that allows other hosts to access its printer.

line printer requester (LPR). A client that allows the local host to submit a data set for printing on a remote printer server.

local area network (LAN). 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 may be subject to some form of regulation.

locale. (1) A description of a cultural environment. (POSIX.0). (2) The definition of the subset of a user's environment that depends on language and cultural conventions. (POSIX.2).

logical printer. In NetSpool, the target of the VTAM print data, which acts as the secondary LU (SLU) on the session.

logical unit (LU). A type of VTAM network accessible unit that enables end users to gain access to network resources and communicate with each other.

logon mode. In VTAM, a subset of session parameters specified in a logon-mode table for communication with a logical unit. See also session parameters.

logon-mode table. In VTAM, a set of entries for one or more logon modes. Each logon mode is identified by a logon mode name.

LPD. line printer daemon

LPR. line printer requester

LU. Logical unit.

LU type. The classification of an LU in terms of the specific subset of SNA protocols and options it supports for a given session, namely:
- The mandatory and optional values allowed in the session activation request
- The usage of data stream controls, function management headers, request unit parameters, and sense data values
- Presentation services protocols such as those associated with FMH usage

LU types 0, 1, 2, 3, 4, 6.1, 6.2, and 7 are defined.

M

Management Information Base (MIB). A logical database made up of the configuration, status, and statistical information stored at a device.

megabyte (MB). (1) For processor storage, real and virtual storage, and channel volume, 1 048 576 bytes. (2) For disk storage capacity and communications volume, 1 000 000 bytes.

MIB. See *Management Information Base*.

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.

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

MVS/ESA™. Multiple Virtual Storage/Enterprise System Architecture.

N

NCP. Network Control Program.

NetSpool. A component of Infoprint Server for OS/390 that allows an installation to automatically direct VTAM application data targeted for a network printer to the JES spool, without changing the VTAM applications. From the JES spool, the data set can be printed on a JES or PSF for OS/390 printer or sent to another location for printing.

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

Network Control Program (NCP). An IBM licensed program that provides communication controller support for single-domain, multiple-domain, and interconnected network capability.

Network Print Facility (NPF). In OS/390 eNetwork™ Communications Server, a feature that routes VTAM, JES2, or JES3 printer output to printers in a TCP/IP network.

NPF. Network Print Facility.

| **NPM.** Network Printer Manager.

| **Network Printer Manager (NPM) for the Web.** IBM
| Network Printer Manager (NPM) for the Web lets
| network administrators monitor, control, and configure
| IBM network printers. NPM also lets network
| administrators monitor some aspects of printers
| controlled by PSF for OS/390 and other manufacturers'
| network printers that comply with RFC 1759.

O

OnDemand. A client/server application that you can use to replace hard copy reports and microfiche, and provide fast, online access to information. An OnDemand server manages electronic archives of reports and documents. You can use an OnDemand client program to search for information and view, print, and FAX copies of reports and documents.

OpenEdition®. See *OS/390 UNIX System Services*.

options data set. In IP PrintWay prior to OS/390 V2R8, a VSAM data set containing one or more options entries. Each options entry contains transmission options used by IP PrintWay. to transmit data sets to a print queue in a TCP/IP network. Each options entry can also contain NetSpool parameters that specify data-set characteristics for use by NetSpool.

output writer. A part of the job entry subsystem that receives job output from the system spool.

OS/390 Print Server. A feature of OS/390 V2R5 through V2R7. The second version of the Print Server is called Infoprint Server for OS/390 and runs on OS/390 V2R8 and higher. The OS/390 Print Server supports printing on OS/390 printers, including local printers and remote printers in a TCP/IP network. The OS/390 Print Server allows you to submit print requests from remote workstations in a TCP/IP network, from OS/390 UNIX System Services applications, from batch applications, and from VTAM applications, such as CICS or IMS applications. The OS/390 Print Server consists of the following components:
- OS/390 Print Interface

- NetSpool
- IP PrintWay
- Printing commands for OS/390 UNIX System Services
- IBM AFP Printer Driver for Windows
- IBM AFP Viewer plug-in for Windows
- OS/390 Printer Port Monitor for Windows

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

OS/390 UNIX System Services. OS/390 services that support an environment within which operating systems, servers, distributed systems, and workstations share common interfaces. OS/390 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. OS/390 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 OS/390 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 tradeoffs, can choose to mix these interfaces.

output data set. (1) A data set that a program opens so that it can write to that file. (2) A file that contains the results of processing.

output writer. A part of the job entry subsystem that receives job output from the system spool.

P

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

page-format table. In NetSpool prior to OS/390 V2R8, a table that defines page-formatting values NetSpool uses for SCS data streams that do not contain SHF (Set Horizontal Format) or SVF (Set Vertical Format) commands. The table can contain several entries, each entry containing a different set of page-formatting values.

parameter. Information that the user supplies to a panel, command, or function.

partitioned data set (PDS). A data set in direct access storage that is divided into partitions, called members, each of which can contain a program, part of a program, or data. Synonymous with program library.

pathname. (1) A filename specifying all directories leading to the file. (2) A filename specifying all directories leading to a file plus the filename itself. (3) A string that is used to identify a file. A pathname consists of, at most, (PATH_MAX) bytes, including the terminating null character. It has an optional beginning slash, followed by zero or more filenames separated by slashes. If the pathname refers to a directory, it may also have one or more trailing slashes. Multiple successive slashes are considered to be the same as one slash. A pathname that begins with two successive slashes may be interpreted in an implementation-defined manner, although more than two leading slashes shall be treated as a single slash. (POSIX.1). In the OS/390 UNIX System Services implementation, the C/370™ functions **fopen()**, **freopen()**, **remove()**, and **rename()** interpret names with exactly two leading slashes, no leading blanks or other characters, and the third character not a slash to mean that the rest of the name refers to a traditional MVS data set.

pel. Picture element.

Picture element (pel, pixel). (1) In computer graphics, the smallest element of a display surface that can be independently assigned color and intensity. (T). (2) The area of the finest detail that can be reproduced effectively on the recording medium. (3) An element of a raster pattern about which a toned area on a photoconductor can appear. (4) The addressable unit on a 3800 Printing System Model 3 or 8.

PIDU. Printer Inventory Definition Utility.

PLU. Primary logical unit.

port. (1) A part of the system unit or remote controller to which cables for external devices (display stations, terminals, or printers) are attached. The port is an access point for data entry or exit. (2) A specific communications end point within a host. A port is identified by a port number.

POSIX. Portable Operating System Interface for Computer Environments, an interface standard governed by the IEEE and based on UNIX. POSIX is not a product; rather, it is an evolving family of standards describing a wide spectrum of operating system components ranging from C language and shell interfaces to system administration.

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

primary logical unit (PLU). In SNA, the logical unit (LU) that sends the BIND to activate a session with its partner LU. Contrast with *secondary logical unit*.

print queue. A list of items waiting to be printed.

Print Services Facility (PSF). A 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.

Print Interface. A component of the OS/390 Print Server that accepts input from remote workstations that have TCP/IP access and from OS/390 UNIX System Services printing commands and creates output data sets on the JES spool.

Print Server. See *OS/390 Print Server*.

printer definition. In Infoprint Server for OS/390, an entry in the Printer Inventory that contains information about an OS/390 printer or set of printers that share the same characteristics. A printer definition contains information that Infoprint Server uses to print files.

Printer Inventory. In Infoprint Server for OS/390, a set of files that contain printer definitions for OS/390 printers. Each printer definition is identified with a unique printer name; the job submitter selects the printer name when printing a file. The printer definitions contain information that Infoprint Server for OS/390 uses to print files.

Printer Inventory Definition Utility. In Infoprint Server for OS/390, a utility program that creates objects in the Printer Inventory.

Printer Port Monitor. See *OS/390 Printer Port Monitor for Windows*.

PrintWay. See *IP PrintWay*.

protocol. A set of semantic and syntactic rules that determines the behavior of functional units in achieving communication.

PSF. Print Services Facility.

PSF/6000. An intelligent printer driver that provides AFP capabilities for the AIX operating system on the RS/6000 system. AFP capabilities include electronic forms, images, graphics, and typographical fonts. Also called PSF for AIX.

R

RACF®. Resource Access Control Facility

Request for Comments (RFC). In Internet communications, the document series that describes a part of the Internet suite of protocols and related experiments. All Internet standards are documented as RFCs.

request unit (RU). A message unit that contains control information, end-user data, or both.

resource. A collection of printing instructions used by Print Services Facility 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.

Resource Access Control Facility (RACF). An IBM-licensed product that provides for access control by identifying and verifying users to the system, authorizing access to protected resources, logging detected unauthorized attempts to enter the system, and logging detected accesses to protected resources.

response unit (RU). A message unit that acknowledges a request unit. It may contain prefix information received in a request unit. If positive, the response unit can contain additional information (such as session parameters in response to BIND SESSION). If negative, the response unit contains sense data defining the exception condition.

Restructured Extended Executor (REXX). A general-purpose, procedural language for end-user personal programming, designed for ease by both casual general users and computer professionals. It is also useful for application macros. REXX includes the capability of issuing commands to the underlying operating system from these macros and procedures. Features include powerful character-string manipulation, automatic data typing, manipulation of objects familiar to people, such as words, numbers, and names, and built-in interactive debugging.

retain time. In IP PrintWay, the length of time to keep a data set on the JES spool after either a successful transmission to the destination or a failed transmission, after retrying the transmission the number of times specified in the retry limit. You can specify a retain time for 2 different situations:
- Retain time for data sets that have been successfully transmitted
- Retain time for data sets whose transmission has failed

retry limit. In IP PrintWay, the maximum number of retries that IP PrintWay is to attempt.

retry time. In IP PrintWay, the time between two attempts to send the data set to its destination.

REXX. Restructured Extended Executor

RFC. Request for Comments.

routing data set. In IP PrintWay prior to OS/390 V2R8, a VSAM data set containing a routing entry for each print queue to which IP PrintWay can transmit output data sets. Each entry contains the name of the remote print queue, the IP address or name of the print queue's host system, the name of an options entry, and other routing information. Each routing entry can also define a NetSpool logical printer.

RU. Request/response unit.

S

SBCS. Single-byte character set.

SCS. SNA Character String.

SDSF. System Display and Search Facility.

secondary logical unit (SLU). In SNA, the logical unit (LU) that receives the BIND request to establish a session with its partner LU. Contrast with *primary logical unit*.

sense code. In SNA, the data sent with a negative response, indicating the reason for the response.

sequential data set. (1) A data set whose records are organized on the basis of their successive physical positions, such as on magnetic tape. (2) A data set in which the contents are arranged in successive physical order and are stored as an entity. The data set can contain data, text, a program, or part of a program. Contrast with *partitioned data set (PDS)*.

server. (1) On a network, the computer that contains the data or provides the facilities to be accessed by other computers on the network. (2) A program that handles protocol, queuing, routing, and other tasks necessary for data transfer between devices in a computer system.

| **Server Message Block (SMB).** (1) A protocol for
| remote file and print access used by Windows clients.
| This protocol is also known as Common Internet File
| System (CIFS). (2) A program that handles protocol,
| queuing, routing, and other tasks necessary for data
| transfer between devices in a computer system.

session. A logical connection between two network accessible units that can be activated, tailored to provide various protocols, and deactivated, as requested.

session parameters. In SNA, the parameters that specify or constrain the protocols, for a session between two network addressable units (NAUs).

| **shell script.** A file of shell commnds. If the file is
| executable; a user can run it by specifying the file's
| name as a shell command or as an operand on **sh** or on
| the TSO/E OMVS command. A shell script is like a
| TSO/E REXX program.

shift-out, shift-in (SOSI). Special EBCDIC or ASCII characters in the data stream that indicate switches between double-byte and single-byte fonts.

Simple Network Management Protocol (SNMP). A protocol that enables a management station to configure, monitor, and receive trap messages from network devices.

single-byte character set (SBCS). A set of characters in which each character is represented by a one-byte code. Contrast with *double-byte character set*.

SLU. Secondary logical unit.

| **SMB.** Server Message Block.

SMF. System Management Facilities.

SNA. Systems Network Architecture.

SNA Character String (SCS). In SNA, a character string composed of EBCDIC controls, optionally intermixed with end-user data, that is carried within a request/response unit.

SNMP. See *Simple Network Management Protocol*.

SNMP agent. Software that enables a device to respond to manager requests to view or update Management Information Base (MIB) data, and send traps reporting problems or significant events.

SNMP Manager. In SNMP, software in a network management station that enables the station to send requests to view or update MIB variables, to send and receive inform-requests, and to receive traps from an agent.

SOSI. See *shift-out, shift-in*.

spool. Simultaneous peripheral operation online.

startup procedure. JCL for a procedure to start an application (or, NetSpool and IP PrintWay).

superuser. A system user who operates without restrictions. A superuser has the special rights and privileges needed to perform administrative tasks.

syntax. The grammatical rules for constructing a command,

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.

System Management Facilities (SMF). An optional control program feature of OS/390 that provides the means for gathering and recording information that can be used to evaluate system usage.

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

T

table reference character (TRC). A numeric character corresponding to the order in which font character sets have been specified with the **chars** job attribute or in the page definition used to print a job. It is used to select a font character set during printing.

TCP. Transmission Control Protocol.

TCP/IP. Transmission Control Protocol/Internet Protocol.

Telnet. In the Internet suite of protocols, a protocol that provides remote terminal connection service. It allows users of one host to log on to a remote host and interact as directly attached terminal users of that host.

Time Sharing Option (TSO). An operating system option that provides interactive time sharing from remote terminals.

trace. A record of the execution of a computer program. It exhibits the sequences in which the instructions were executed. (A)

transform. A program that converts a data stream from one format to another, for example, from PCL to AFP, PDF to AFP, and so on. The IBM-provided transforms are implemented as DLL filters.

Transmission Control Protocol (TCP). A communications protocol used in 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 assumes that the Internet protocol is the underlying protocol.

transmission-queue data set. In IP PrintWay, a data set containing an entry for each data set that IP PrintWay is to transmit to the remote system or that IP PrintWay is retaining on the JES spool.

transparent data. (1) Data that is of no significance to the receiver. (2) Data that can contain any hexadecimal value.

trap. A message that reports a problem or a significant event.

TRC. Table reference character.

U

UCS. Universal character set.

universal character set (UCS). A printer feature that permits the use of a variety of character arrays. Synonymous with *font*.

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 filter. A filter that accepts input via **stdin**, and returns the output via **stdout**. Options and positional arguments can be specified. UNIX filters may be any shell executable, for example, a shell script, a REXX exec, a C program, and so on. See also filter. Contrast with DLL filter.

UNIX System Services. See *OS/390 UNIX System Services*.

user port. In IP PrintWay, a port address that is outside the range of addresses defined in RFC 1179 for the LPR source port.

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. Virtual Telecommunications Access Method.

W

Workbench for OS/2® and Windows. An application that runs under Windows or WIN-OS/2® that enables you to browse and print AFP documents and resources on your workstation.

Bibliography

This section lists publications that may be helpful to you as you configure and use Infoprint Server for OS/390.

Infoprint Server for OS/390

Title	Order Number
OS/390 Infoprint Server Customization	G544-5694
OS/390 Infoprint Server Introduction	G544-5696
OS/390 Infoprint Server Messages and Diagnosis	G544-5690
OS/390 Infoprint Server Migration	G544-5697
OS/390 Infoprint Server Operation and Administration	S544-5693
OS/390 Infoprint Server User's Guide	S544-5692

Print Services Facility for OS/390

Title	Order Number
AFP Conversion and Indexing Facility: User's Guide	S544-5285
PSF for OS/390: Customization	S544-5622
PSF for OS/390: Diagnosis	G544-5623
PSF for OS/390: Download for OS/390	S544-5624
PSF for OS/390: Introduction	G544-5625
PSF for OS/390: Messages and Codes	G544-5627
PSF for OS/390: User's Guide	S544-5630

Advanced Function Presentation (AFP)

Title	Order Number
AFP: Printer Information	G544-3290
AFP: Printer Summary	G544-3135
AFP: Programming Guide and Line Data Reference	S544-3884
IBM AFP Fonts: Font Summary	G544-3810
IBM AFP Fonts: Font Summary for AFP Font Collection	S544-5633
IBM Data Stream and Object Arcitectures: Bar Code Object Content Architecture Reference	S544–3766

OS/390 Version 2 Release 8

Title	Order Number
OS/390 C/C++ Programming Guide	SC09-2362
OS/390 Distributed File Service SMB Administration Guide and Reference	SC24-5882

Title	Order Number
OS/390 ISPF Dialog Developer's Guide and Reference	SC28-1273
OS/390 JES2 Commands	GC28-1790
OS/390 JES2 Initialization and Tuning Guide	SC28-1791
OS/390 JES2 Initialization and Tuning Reference	SC28-1792
OS/390 JES3 Commands	OS/390 JES3 Commands
OS/390 JES3 Initialization and Tuning Guide	SC28-1802
OS/390 JES3 Initialization and Tuning Reference	SC28-1803
OS/390 MVS JCL Reference	GC28-1757
OS/390 MVS Product Management	GC28-1730
OS/390 MVS Programming: Authorized Assembler Services Reference ALE-DYN	GC28-1764
OS/390 MVS Programming: Authorized Assembler Services Reference ENF-IXG	GC28-1765
OS/390 MVS Programming: Authorized Assembler Services Reference LLA-SDU	GC28-1766
OS/390 MVS Programming: Authorized Assembler Services Reference SET-WTO	GC28-1767
OS/390 Planning for Installation	GC28-1726
OS/390 SDSF Guide and Reference	SC28-1622
OS/390 Security Server (RACF) General User's Guide	SC28-1917
OS/390 Security Server (RACF) Security Administrator's Guide	SC28-1915
OS/390 Summary of Message Changes	GC28-1499
OS/390 UNIX System Services Command Reference	SC28-1892
OS/390 UNIX System Services User's Guide	SC28-1891

OS/390 SecureWay® Communications Server

Title	Order Number
OS/390 eNetwork Communications Server: SNA Programming	SC31-8573
OS/390 SecureWay Communications Server: IP Application Programming Interface Guide	SC31-8516
OS/390 SecureWay Communications Server: IP Configuration	SC31-8513
OS/390 SecureWay Communications Server: IP Migration	SC31-8512
OS/390 SecureWay Communications Server: SNA Diagnosis V1 Techniques and Procedures	LY43-0079
OS/390 SecureWay Communications Server: SNA Diagnosis V2 FFST Dumps and the VIT	LY43-0080
OS/390 SecureWay Communications Server: SNA Messages	SC31-8569
OS/390 SecureWay Communications Server: SNA Network Implementation	SC31-8563
OS/390 SecureWay Communications Server: SNA Operation	SC31-8567
OS/390 SecureWay Communications Server: SNA Resource Definition Reference	SC31-8565
Systems Network Architecture: Sessions Between Logical Units	GC20–1868

CICS for OS/390

Title	Order Number
CICS Customization Guide	SC33-1683
CICS Diagnosis Reference	LY33-6088
CICS Resource Definition Guide	SC33-1684
CICS Supplied Transactions	SC33-1686

IMS/ESA® Release 5

Title	Order Number
IMS/ESA Application Programming: EXEC DLI Commands for CICS and IMS	SC26-8726
IMS/ESA Administration Guide: System	SC26-8730

3270 Data Stream

Title	Order Number
IBM 3270 Kanji Data Streams	GA18–2980

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OS/390
Infoprint Server Introduction

Publication No. G544-5696-01

Overall, how satisfied are you with the information in this book?

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
Overall satisfaction	☐	☐	☐	☐	☐

How satisfied are you that the information in this book is:

	Very Satisfied	Satisfied	Neutral	Dissatisfied	Very Dissatisfied
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Easy to find	☐	☐	☐	☐	☐
Easy to understand	☐	☐	☐	☐	☐
Well organized	☐	☐	☐	☐	☐
Applicable to your tasks	☐	☐	☐	☐	☐

Please tell us how we can improve this book:

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