iSeries

Guide to Output

iSeries

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> **Note**
>
> Before using this information and the product it supports, be sure to read the information in "Notices" on page 289.

Eighth Edition (February 2006)

This edition applies to i5/OS Version 5 Release 4 Modification 0, and to all subsequent releases and modifications until otherwise indicated in new editions or technical newsletters. Be sure to use the correct edition for the level of the system.

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About iSeries Guide to Advanced Function Presentation (S544–5319)

This guide is based on the standard iSeries course on printing. It is designed to be used as an educational guide as opposed to a reference book. The guide is divided into three parts:

Part I introduces you to the iSeries output architecture. This includes how documents are composed and stored on iSeries as well as how they are printed or delivered electronically. Part I breaks down the iSeries document into logical components - fonts, overlays, images, and barcodes, describing each in detail.

Part II looks at the techniques and applications used to create documents on the iSeries. One typical document application, an invoice, is used as a case study. In this part, we examine how each technique or application would be applied to create the invoice.

Part III turns our attention to document delivery. Once our invoice has been generated and is sitting in an iSeries output queue, what options are available to deliver the document to the consumer of that document?

- Chapter 23, "Deciding on an Output Strategy and Set of Tools," on page 247

The book also contains these appendices:
- Appendix A, "iSeries Font Libraries," on page 253
- Appendix B, "Additional DDS Examples," on page 257
- Appendix C, "Performing Advanced Font Tasks with iSeries Navigator," on page 277
- "How PSF Searches for Resources" on page 285

Other sections are:
   Glossary
   "Bibliography" on page 303

Who Should Read This Book

The information in this publication is directed at people in applications and operational functions that want to learn how to use iSeries™ tools to create and distribute electronic documents.

This publication is written with the assumption that you have experience with application programming. It is also assumed that you are familiar with the system and using it to print.

Conventions and Terminology Used in This Book

In this publication, this special terminology is used:
- The term "AFP™ Viewer" refers to both the AFP Workbench Viewer, available with iSeries Access, and the AFP Viewer Plug-in, available as a free download from IBM®.
- The term "iSeries Access" refers to both Client Access and iSeries Access.
- The term "printer" refers to both physical and virtual printers. Virtual printers have no hardware and return electronic output instead of paper output. For example, to transform certain types of data you send the spooled file to a virtual printer. To the system, the transform looks like a printer.
- Print Services Facility™ for i5/OS is referred to as PSF throughout this publication.
- The term "TrueType" applies to both TrueType and OpenType fonts, unless otherwise specified.

These rules apply to i5/OS command syntax throughout this publication:
- Variable data is printed in italics. Enter specific data to replace the characters in italics. For example, for *indexing-page-limit* you could enter 50. Italics also identify the names of publications.
- Commands are printed in all upper case letters. They must be entered exactly as they appear.
- Values are enclosed in parenthesis, for example, (*file*). Enter the parenthesis as part of the parameter.

Monospacing, for example, `this is monospaced`, is used for examples and Web addresses.

Prerequisite and Related Information

Use the iSeries Information Center as your starting point for looking up iSeries technical information.

You can access the Information Center two ways:

- From the following Web site:

  http://www.ibm.com/eserver/iseries/infocenter

- From the *iSeries Information Center*, SK3T-4091-04 CD-ROM. This CD-ROM ships with your new iSeries hardware or IBM i5/OS software upgrade order. You can also order the CD-ROM from the IBM Publications Center:

  http://www.ibm.com/shop/publications/order

The iSeries Information Center contains new and updated iSeries information such as software and hardware installation, Linux, WebSphere, Java, high availability, database, logical partitions, CL commands, and system application programming interfaces (APIs). In addition, it provides advisors and finders to assist in planning, troubleshooting, and configuring your iSeries hardware and software.

With every new hardware order, you receive the *iSeries Setup and Operations CD-ROM*, SK3T-4098-02. This CD-ROM contains IBM @server iSeries Access for Windows and the EZ-Setup wizard. iSeries Access Family offers a powerful set of client and server capabilities for connecting PCs to iSeries servers. The EZ-Setup wizard automates many of the iSeries setup tasks.

For other related information, see the "Bibliography" on page 303.

How to Send Your Comments

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Summary of Changes

Summary of Changes for *iSeries Guide to Output*, **S544-5319-06**.

This publication contains additions and changes to information that was previously presented in *iSeries Guide to Output*, S544-5319-05, which supports OS/400 Version 5 Release 3. The technical additions and changes are marked with a revision bar (|) in the left margin.

These changes have been made throughout the manual:
- The IBM AFP PrintSuite for iSeries (PrintSuite) product is no longer offered. PrintSuite was made up of these components:
  - Advanced Print Utility (APU) for iSeries. A complimentary version of the product is available as an unsupported download.
  - Page Printer Formatting Aid (PPFA) for iSeries. Infoprint Designer for iSeries is the replacement product.
  - AFP Toolbox for OS/400. A complimentary version of the product is available as an unsupported download.
  - SAP R/3 Print.

  References to PrintSuite and its components have been removed.
- The current operating system for the iSeries is i5/OS. References to OS/400 have been removed as appropriate.
- The information in the Printer Device Programming manual has been moved to the iSeries Information Center. References to the manual have been removed.

The following information is new or updated:
- iSeries AFP Font Collection Tools has been renamed to iSeries AFP Font Utilities. You can now use the commands with both Infoprint Fonts and AFP Font Collection fonts. See "IBM iSeries AFP Font Utilities" on page 54 for more information.
- The appendix "Migrating from OfficeVision/400" has been removed.
- The values for the PSF Defined Option parameter are described in Chapter 5, "Introduction to PSF Configuration Objects," on page 39.
- Detailed information about the font products in "i5/OS Font Products" on page 62 has been removed. For detailed information, refer to the appropriate product publications.

Part 1. Introduction to Advanced Function Presentation

Part I introduces you to the iSeries output architecture. The iSeries output architecture is for composing and storing documents as well as printing or delivering the information electronically. Part I breaks down the iSeries document into logical components - fonts, overlays, images, and bar codes, describing element in detail.

1

Chapter 1. iSeries Output

iSeries output is the subject of this guide, with the focus on the options available to generate the kinds of documents required to compete in today's business environment. This is an environment where traditional standards of document content and document delivery might not be adequate. Some changes to document content, such as bar coding, have moved printed pages into the overall business process workflow. The Internet and intranets have driven e-business process reengineering where hardcopy printed pages may no longer suffice. These changes generally make an electronic document essential to most business applications and electronic delivery critical to many.

Re-engineering Business Documents?

In all likelihood, you have turned to this book to learn how new business documents could be developed or existing documents re-engineered in order to meet one or more new requirements within your organization. Those requirements might include:

Migrating preprinted forms: The costs of preprinted forms, including material costs and operational inefficiencies, has become too high.

Requirements from customers or suppliers: A very common example is the need to generate bar codes on documents. Related to the trend above, iSeries customers might be forced to upgrade print applications as a result of customer or supplier relationships. As an example, all suppliers to major retailers such as Wal-Mart must produce shipping documents, including bar codes, that conform to a supplier standard. These are "hard" standards that a vendor or supplier must implement to continue doing business. There are many additional "soft" standards where a company has strong incentives to implement application changes. These include the use of Maxicode bar code for shipping labels (driven by UPS), postal bar codes, and PDF417 bar code a high-capacity barcode used by more and more public agencies.

Document effectiveness: Your current statements are identical in form and content for all of your customers but you want to use information about individual customers to tailor their statement dynamically. This trend is accelerated with data warehouses and BI (Business Intelligence) tools that enable communications to customers to be much more customized.

Document design changes: Your documents change on a frequent basis and the current tools to make design changes cannot respond.

Document processes: Once documents and reports are fully electronic, the information flow that they represent can be re-engineered. For example, instead of printing sales reports each month, the reports can be produced electronically and organized within an archive, such as IBM Content Manager OnDemand for iSeries (OnDemand), for retrieval as required. Documents such as invoices, policies, or statements can be similarly stored for access by Customer Service (CRM) applications.

Competitive advantage or disadvantage: Your competitors are far ahead in document content, effectiveness, and process, which is starting to affect sales.

Internet application reengineering: You are transforming key business processes for the Web and your documents need to be fully electronic to support that.

Electronic delivery: You are looking at the possibilities of Infoprint® Server for iSeries: PDF and e-mail, electronic delivery of documents and reports — and again, you need fully electronic documents to take advantage of these capabilities.

IT Costs: The current system of changing design requires programming changes, escalating costs for what should be simple changes, requiring unacceptable delays, and causing disruption in stable application code.

iSeries Output Architecture

A good place to start is with a short primer about the iSeries output architecture. Figure 1 shows a conceptualized view of the output flow.
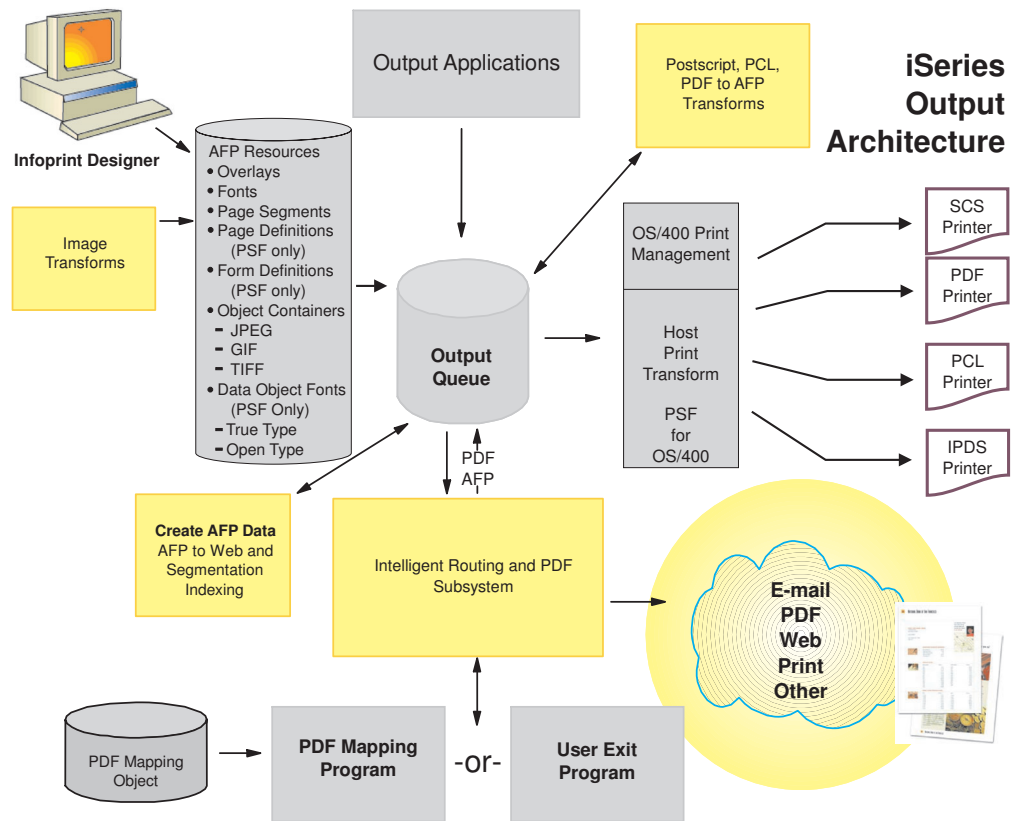
Figure 1. iSeries Print Flow

In this framework, iSeries applications produce output such as documents and reports by working through a printer file and optionally, Data Description Specifications (DDS). The generated print files, called *spooled files*, are written to iSeries output queues. Output queues are holding areas for spooled files and as "queue" implies, the files are ordered to be delivered out of the output queue in a first in, first out (FIFO) sequence. Also, non-iSeries applications can produce print files and route them to iSeries output queues.

If printing is the delivery method, Figure 1 illustrates the different printer drivers supported - i5/OS, Host Print Transform, and Print Services Facility for i5/OS (PSF). The printer driver is selected automatically based on the type of spooled file and the protocol of the target printer.

In summary, business documents and reports are produced, staged within output queues, and then delivered to the appropriate consumer in the desired format.

Page Architecture

Before we progress any farther, we should zoom into the output queue and focus on what is contained within spooled files; namely, pages of information. Figure 2 shows a logical schematic of a typical business page.
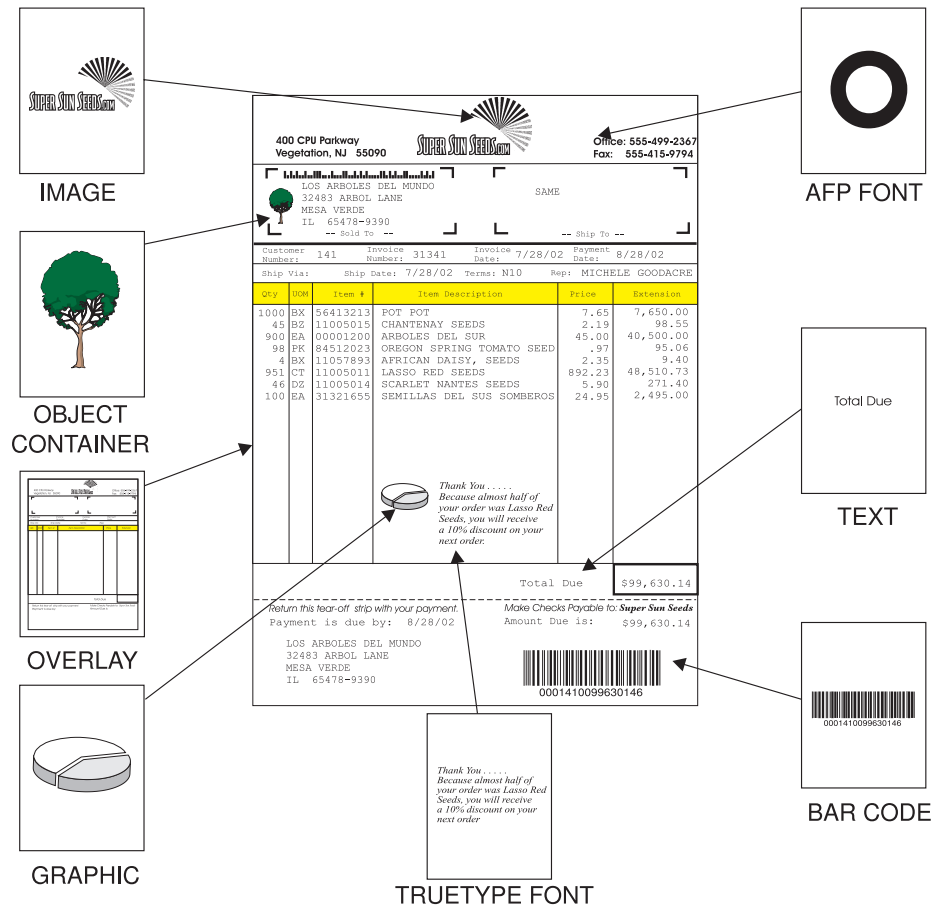
Figure 2. AFP Page Architecture

The document contains various logical components -- images, overlays, bar codes, and static and variable text in a variety of fonts. Advanced Function Presentation™ (AFP) is the integrated architecture for iSeries pages. For those applications that only produce simple text, the iSeries data stream is SNA Character Set (SCS). SCS does not support graphical page elements and is normally used for simple reports or documents that use pre-printed forms.

Because of the myriad requirements in today's IT environment for creating complex, fully electronic documents, we will focus on the graphical page and AFP. Besides handling the required graphical complexity, an additional key attribute of AFP page architecture is its component sub-architecture. Most of the page components are separate and external to the page data-stream. AFP was designed for business output, and certain operating characteristics – performance, reliability, and security – are essential for this environment. There are certainly other page

data streams, such as PCL and PostScript. Both of these page data-streams support complex graphical elements but were designed for personal print applications, not business applications.

What does this "business design" mean? Let's take up performance. Business production printers currently top out at 2200 pages per minute, and speeds are increasing. With complex graphical applications, the system must be able to get all of the page components to the printer at that throughput speed. With AFP, the page elements such as fonts, images, and overlays are separate iSeries objects. They are not embedded in the print data stream as with PostScript and PCL. This enables graphical objects that are used on multiple pages to be handled separately. In the case of high-speed printing, fonts, images, and overlays are cached in printer memory and are only sent to the printer if they are not already in printer memory.

This design function of AFP requires another element - interactive management. You will see two different data streams mentioned with AFP, AFP Data Stream (AFPDS) and Intelligent Printer Data Stream™ (IPDS™). IPDS is slightly different from the source AFPDS and includes operation code specific to the printer being addressed. The IPDS data stream facilitates the interactive dialog between iSeries and printer, controlled by PSF/400 (hereafter referred to as PSF). This dialog supports the page object caching we just described. The IPDS dialog is also central to the print process, managing errors and print recovery.

The separation of page elements into objects with AFP also provides for security. For example, a MICR font used in a check application is like any AFP font, a separate font object. As such, standard i5/OS security can be used to ensure that the font is only accessed by authorized users or applications.

As "Font Architecture" on page 49 depicts, the objects within AFP page architecture have their own definition. Another name for AFP is Mixed Object: Document Content Architecture for Presentation (MO:DCA-P). The page element objects follow an "OCA" pattern, as follows:

Table 1. AFP Page Elements and Respective Sub-architecture

Page Element	OCA Sub-Architecture
Font character sets, coded fonts, code pages	Font Object Content Architecture - FOCA
Bar codes	Bar Code Object Content Architecture - BCOCA
Overlays	Comprised of all OCA types, data object resources, and data object fonts
Images (i5/OS page segments)	Image Object Content Architecture - IOCA
Graphics	Graphics Object Content Architecture - GOCA
Object containers	Non-OCA, such as a TIFF image

AFP has been extended to allow non-OCA objects to be included in pages. Object containers allow you to include non-OCA objects such as TIFF and GIF images on a page. Support for object containers and other object types varies by output device. Therefore, you must verify that your output device supports object containers and the type of object contained in the object container before including them in your data.

Subsequent chapters within Part I describe each of these object content architectures in detail.

An additional note about ASCII data streams such as PostScript and PCL: i5/OS lets you queue ASCII output data by specifying the USERASCII data type. However, these spooled files are not integrated into the functions supported with SCS and AFP data streams such as:

- Spooled file view (with iSeries Access)
- Archive
- "Downstream" output functions such as fax, e-mail, and transform to PDF
- IPDS print management

Printer Files and DDS

Let's go back to Figure 1 on page 4 and focus on the flow between the application program and the output queue. Every program on iSeries that produces output has a printer file associated with it. The basic printer file determines overall attributes for the job. These include simplex or duplex, page range, finishing, orientation, and positioning (including N-up). As we will see, the printer file can also contain references to page definition and form definition objects, which can provide job attributes and page formatting specifications.

An optional element of the printer file is DDS. DDS is used in other areas of i5/OS to define database files, communication files, and other objects. The DDS within a printer file specifies how application data is placed on the page. Again, DDS is optional. If it is not used, then output data definition and placement must be defined within the application program. DDS is external to the application program but tightly linked to it. As we shall see, this linkage is important. The programmer can specify the data and position of every page element (text, lines, boxes, overlays, bar codes, and images) dynamically. The programmer can, in essence, create the page "on the fly" using DDS in conjunction with application program logic.

There are several disadvantages to using DDS for output design. Those disadvantages are in large part the reason for this guide and its case study of alternative document enabling and design tools. First, DDS, while not compiled with the application program, is intertwined in logic with it. Therefore, DDS is not application-independent (like Infoprint Designer for iSeries, for example) and DDS formatting changes normally involve application changes. Second, DDS is a programming interface and does not have a graphical design interface. With more and more complex fully graphical documents, this makes design and design changes more difficult. Finally, there are a few functions, such as dynamic formatting of paragraphs, that are not supported with DDS. Still, DDS remains a very powerful interface to the page.

AFP Page Resources Continued

If we go back to Figure 1 on page 4 and our iSeries output architecture, there are a number of page resources listed to the left of the output queue. We have already introduced the "OCA" page components – fonts, overlays, and page segments. Two additional page resources remain – page definitions and form definitions. These are less well-known but no less important. These i5/OS objects are job and page formatting resources as opposed to page components. A page definition is concerned with information layout on the page. It provides function similar to DDS. A form definition is concerned with job structure, such as simplex or duplex, number of copies, and orientation. It provides some of the functions found in the

printer file. Both the page definition and form definition are, in reality, programming languages, thus the source statements of the language must be compiled in order to create the resource object.

These page resources can be used in conjunction with the printer file and DDS. The key advantage is application independence. You can design job logic and page content without changing the application program. Infoprint Designer provides a fully graphical interface to the design of these page resources.

Printing

Once a spooled file has been created in an output queue, one delivery option is to print the file. There are several print deliverers, or printer writers, available. The selection of the printer writer is automatic by i5/OS and based on the input data stream and the output printer. The three printer writers and their roles are summarized below:

Table 2. i5/OS Printer Writers

Printer Writer	Input Data Stream	Output Printer
i5/OS Printer Writer	SCS, Limited IPDS	SCS, Limited IPDS
Print Services Facility/400 (PSF/400)	AFP, IPDS	IPDS
LPR Driver (using Host Print Transform)	AFP, SCS, ASCII	ASCII
PJL Driver (using Host Print Transform)	AFP, SCS, ASCII	ASCII
SNMP Driver (using Host Print Transform)	AFP, SCS, ASCII	ASCII

i5/OS Printer Writer
> The SCS printer driver is part of i5/OS. It is the printer writer for Twinax-attached printers that can accept either SCS or IPDS. Because SCS is part of the Systems Network Architecture (SNA) protocol, it cannot be sent over TCP/IP protocol. To print to a TCP/IP-connected printer, the data stream must be converted to either IPDS or ASCII to make the transit. As Twinax becomes much less prevalent, this printer writer is less of a factor in iSeries printing.

Print Services Facility/400 (PSF/400)
> PSF/400 (a priced feature of i5/OS) is the print manager for AFP data streams and IPDS printers. If the target printer is IPDS, then control is passed from i5/OS to PSF/400. PSF/400 is central to making the AFP page architecture and IPDS print management process work.

ASCII Printer Drivers
> If the target printer is ASCII – either line-oriented ASCII (such as ProPrinter) or page-oriented ASCII (PCL), then one of three print drivers can be selected. Those are (1) LPR (also known as remote output queue), (2) PJL driver, and (3) SNMP driver. All of these ASCII print drivers are intended for lower volume, less mission-critical printers. Without the AFP page architecture and IPDS-enabled print dialog, they cannot compete with IPDS in terms of functionality, printing management, and error recovery. LPR is the most limited in function – the ASCII data is simply sent to a TCP/IP address with no management. The PJL and SNMP print drivers add a little more intelligence (such as page range support). Target printers must support PJL or SNMP commands.

Because i5/OS spooled files are normally encoded in EBCDIC and are structured in either SCS or AFP data stream format, transform services are needed before

invoking one of the ASCII printer drivers. The transform subsystem is Host Print Transform (HPT). HPT is responsible for converting SCS and AFP spooled files to ASCII. An alternative to this is Infoprint Server's ability to convert iSeries spooled files to PDF and respool them for printing on PDF-capable printers. See Chapter 20, "Working with Infoprint Server," on page 205 for more information.

E-business output

Figure 1 on page 4 has a number of non-print structures at the bottom. These elements represent electronic delivery function. While printing certainly remains a central and critical delivery mechanism, electronic options have rapidly emerged.

Traditional output followed a "print and distribute" model. That is, application output was always printed then distributed to the point of need. However, the business computing model has shifted, becoming more technologically efficient and embracing e-business practices and models. To remain competitive, companies must restructure many business processes. An essential part of this re-structuring is the need to adjust the flow of output to systems, suppliers and customers. This re-structuring takes advantage of the network (Internet and intranets) and delivers reduced costs, increased service levels, and competitive advantage.

Business documents (which might be the only communications a company has with its customers or suppliers) in hard copy format do not fit very well into these e-business-driven process changes. For example, output that was formerly printed and distributed now might need to be produced and distributed electronically. "E-output" is a term that defines this shift in the flow of formatted information within business.

Let's take an example - a supply chain document application. In the traditional print model, orders were received and processed. Shipping notices were created by an iSeries application program, and these documents were promptly printed (usually on top of a pre-printed form) and sent. In a re-engineered supply chain process, orders are taken over the Web and order documents would flow out immediately and electronically.

Let's look at e-output in a little more detail. In general, there are two basic approaches to the electronic delivery of information (pages) – inbound and outbound. With inbound, the pages are organized within the iSeries database and the user proactively accesses them by a client or browser. Note that with inbound electronic access, the information (documents and reports) can reside in either iSeries databases or in archival systems. In fact, archival systems take on a significant middleware role in the organization of information for later retrieval. iSeries archive and retrieval systems such as OnDemand and OnDemand Common Server fill this role.

With outbound delivery, the formatted pages of information are normally sent directly (by e-mail) to the desired destination.

Chapter 20, "Working with Infoprint Server," on page 205 introduces you to Infoprint Server for iSeries. Infoprint Server is a key piece in the iSeries output architecture. It provides a number of functions to enable e-output. First, Infoprint Server provides PDF services for iSeries. PDF is the standard electronic document distribution format for the Internet environment. Documents and reports produced in PDF format can be routed to an iSeries database for inbound electronic access, sent by e-mail, or both. Infoprint Server also supports production of portable AFP

documents. Ideal for intranet applications, portable AFP can be routed like PDF and viewed either with iSeries Access or with browser AFP plug-ins.

An additional feature of Infoprint Server – in the top right of Figure 1 on page 4 – is the ASCII transform server. This enables the iSeries to extend its role as a print server, taking jobs that are being produced in non-iSeries formats (specifically, PCL, PostScript, and PDF) and converting them to AFP for iSeries-managed printing. These jobs could reside on network clients or servers, or on iSeries applications (such as ERP) that create ASCII data streams.

Chapter 2. What is Advanced Function Presentation (AFP)?

AFP is an architected system of hardware and software for creating, formatting, viewing, retrieving, printing, and distributing information on a wide variety of printer and display devices. It is the native, integrated data stream on the iSeries for generating fully composed pages of data.

Traditional line-mode print applications compose a line at a time down the page (usually continuous form pages), whereas AFP composes the entire page prior to printing. In AFP, page elements such as text, images, bar codes, and overlays, can be specified in any order at any position in the page. This is called *all points addressability*. AFP data stream (AFPDS) is a printer-independent data stream that composes full pages within a document. AFP was used to produce the invoicing document shown in Figure 3 on page 13.

The AFP architecture governs the creation and control of data types (such as text, fonts, images, graphics, bar codes, fax, color, audio, and multimedia) so that computer output is more readable and attractive. AFP's specific interchange architecture, MO:DCA-P, makes information interchange possible among different platforms using different protocols. These platforms include:

- OS/390® and z/OS™
- VM
- VSE
- i5/OS
- AIX®
- Windows NT® and Windows® 2000

The term "mixed" in the MO:DCA-P architecture refers both to the mixture of data objects and the mixture of document constructs that make up the document. Figure 3 on page 13 illustrates the object-oriented nature of AFP. Each data object type has unique processing requirements. An Object Content Architecture (OCA) has been established for each IBM data object to define its respective syntax and semantics. MO:DCA-P documents can contain data and data objects governed by the OCAs described below. Notice the similarities between the list of OCAs and the list of AFP page elements in the description of Figure 3 on page 13.

Bar Code Object Content Architecture (BCOCA)
> BCOCA defines how the various industry-standard bar codes are composed. A bar code object carries the alphanumeric information that is to be presented as a bar code and the controls to present this information in a bar code symbology. See "Bar Codes" on page 69 for information about bar codes.

Image Object Content Architecture (IOCA)
> IOCA represents image data in device-independent format. This lets the image be scaled to the print resolution of different printers, for example. IOCA also supports image compression, reducing the storage size of the image data by 70% or more. See "Images and Graphics" on page 63 for information about images.

Graphics Object Content Architecture (GOCA)
> GOCA describes complex pictures that are built by a series of graphic commands. On iSeries, Business Graphic Utility (BGU) and Graphic Data

Display Manager (GDDM®) create GOCA files such as bar charts and pie charts. See "Images and Graphics" on page 63 for information about graphics.

Presentation Text Object Content Architecture (PTOCA)
PTOCA defines how text is presented and positioned in the document. PTOCA must handle text in a wide variety of types, positions, and orientations.

Font Object Content Architecture (FOCA)
FOCA defines a consistent format and structure for font resources. See "AFP Fonts" on page 45 for information about fonts.

MO:DCA-P documents can also contain or reference some non-OCA data objects that are registered in the MO:DCA-P architecture. Such data objects can be carried in a generic MO:DCA-P object envelope called an **object container**. Some examples of data objects that can be carried in an object container are image objects in Tagged Image File Format (TIFF), PDF single-page objects, and color mapping tables (CMT).

Careful: While an object container can include almost any type of data, it is the user's responsibility to verify that the output device can handle the type of data in the container.

With MO:DCA-P Include Object (IOB) structured field support, applications can include images, bar codes, page segments, and graphics in documents, taking advantage of scaling and rotating capabilities. For example, you can include a single copy of a company logo in a resource library, scaling and rotating the logo as necessary.

Note: Images, bar codes and graphics can be included by an IOB only if they are inline objects within the data stream. There is no mechanism in iSeries to store these as external objects on the system.

AFP Data Streams

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

- MO:DCA-P data stream, which was discussed above, is the application data stream through which applications can describe pages composed of text, images, and graphics data. MO:DCA-P is device independent; therefore, applications that produce this data stream can be directed to any of the printers supported by the AFP system or to graphical displays for viewing.
- Intelligent printer data stream (IPDS) is the printer device data stream that contains the information necessary to identify, monitor, and control the printer's functions. IPDS enables a two-way dialog between the printer and the printer driver, such as PSF, to create a cooperative print management system. IPDS is device dependent.

Elements of AFP Output

AFP output can contain any of these elements on each page:

- Text
- Images
- Graphics

- Bar codes
- Overlays
- Object containers

Figure 3 shows a sample of AFP output using PSF. The sample page is used throughout this publication to illustrate the various AFP functions.
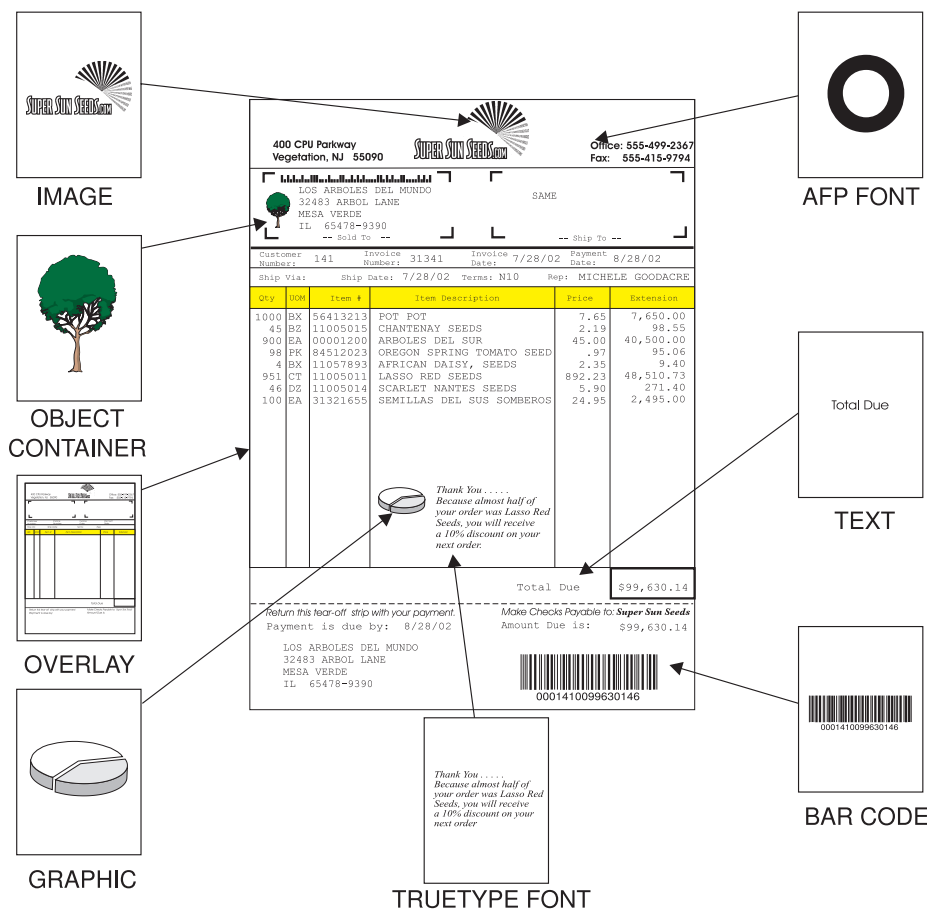
Figure 3. Sample of AFP Output Using PSF

Text and Fonts

Text is character data in the form of letters, numbers, punctuation marks, special characters, and signatures. Character data is printed using fonts, and each page can include several different fonts. You can find more information about fonts in "AFP Fonts" on page 45 and Chapter 8, "Working with AFP Fonts," on page 91.

Images

Image data is a series of picture elements (pels) arranged in rows and columns.

Image data is created either by a scanning device or a program and is stored in a set of MO:DCA-P structured fields called an image data object. The image data can be included in a print job, in an overlay resource, or in a page segment resource. PSF accesses and sends image resources to the printer with the print job. See "Images and Graphics" on page 63 and Chapter 9, "Working with Images," on page 99 for more information.

Graphics

Graphics data contains commands to draw lines, arcs, and circles and can be used to represent something as complex as a three-dimensional engineering drawing.

Graphics data is created by a program and stored in a set of MO:DCA-P structured fields called a graphics data object. A graphics data object can be included in a print job, in an overlay resource, or in a page segment resource. PSF accesses and sends graphics resources to the printer with the print job. See "Images and Graphics" on page 63 and Chapter 9, "Working with Images," on page 99 for more information.

Bar Codes

Bar codes represent characters two ways: by sets of parallel bars of varying thickness and separation that can be read optically by transverse scanning (linear bar codes) or in a two-dimensional matrix (2D bar codes). Linear bar codes are often used to represent product numbers, part numbers, and zip codes. 2D bar codes can store much larger amounts of information by using extensive data compaction and error correction codes.

Many different types of bar code arrangements, or symbologies, have been developed for specific applications. The zip code at the top of the sample page is printed in POSTNET bar code. The customer number and invoice amount are printed in Interleaved 2 of 5 bar code at the bottom of the page.

For more information about bar codes, see "Bar Codes" on page 69 and Chapter 11, "Working with Bar Codes," on page 113.

Overlays

The ability to combine data with print resources enables you to use an application to merge data with an overlay, or electronic form. An overlay contains constant information and the print job created by the application contains the variable data that is printed on the overlay. PSF can print both the variable data and the overlay on one sheet, eliminating the need for preprinted forms when printing the variable data. PSF also can print an overlay on a blank page containing no variable data. For more information see "Overlays" on page 67 and Chapter 10, "Working with Overlays," on page 107.

Object containers

Object containers are MO:DCA objects that envelop and carry object data. The object data might or might not be specified by an IBM presentation architecture. The object data is not constrained to be traditional text, image, or graphics. If the object is a traditional presentation object, it must be paginated, that is its presentation space must be constrained to a single page. For presentation objects, the object data in the container is presented when the object container is included on a page or overlay using the Include Object (IOB) structured field. The object container can also be included directly on a page or overlay. See "Object Containers" on page 80 for more information about object containers.

PSF for i5/OS

PSF for i5/OS (hereafter referred to as PSF) is the AFP system software (printer writer) for printers that use IPDS. It can be thought of as the glue between the application and the printer. PSF enables i5/OS users and applications to take full advantage of IPDS printer capabilities.

i5/OS supports line printers and a subset of IPDS printers and print functions without PSF, while PSF provides full support for all IPDS printers. Because PSF is integrated with i5/OS print support mechanisms such as printer files and data description specifications (DDS), it is an extension of print processes already familiar to most i5/OS users. Whether PSF is used to process application output is determined by the device description for the target printer. Only printers defined as AFP(*YES) in the printer device description are controlled by PSF.

PSF ensures that applications and their AFP resources print consistently on all of the printers it manages. PSF transforms and prints these data streams:
- XML (requires an XML page definition)
- PostScript (requires Infoprint Server feature 5101)
- PDF (requires Infoprint Server feature 5101)
- PCL
- IBM MO:DCA-P, also called AFPDS, the device-independent AFP page data format
- IPDS, the device-dependent page printer data stream
- SNA Character String (SCS)
- Extended binary-coded decimal interchange code (EBCDIC) line printer data

Print Flow with PSF

The PSF print flow, shown in Figure 4 on page 16, is similar to the i5/OS print flow, making AFP on the i5/OS easy to use.
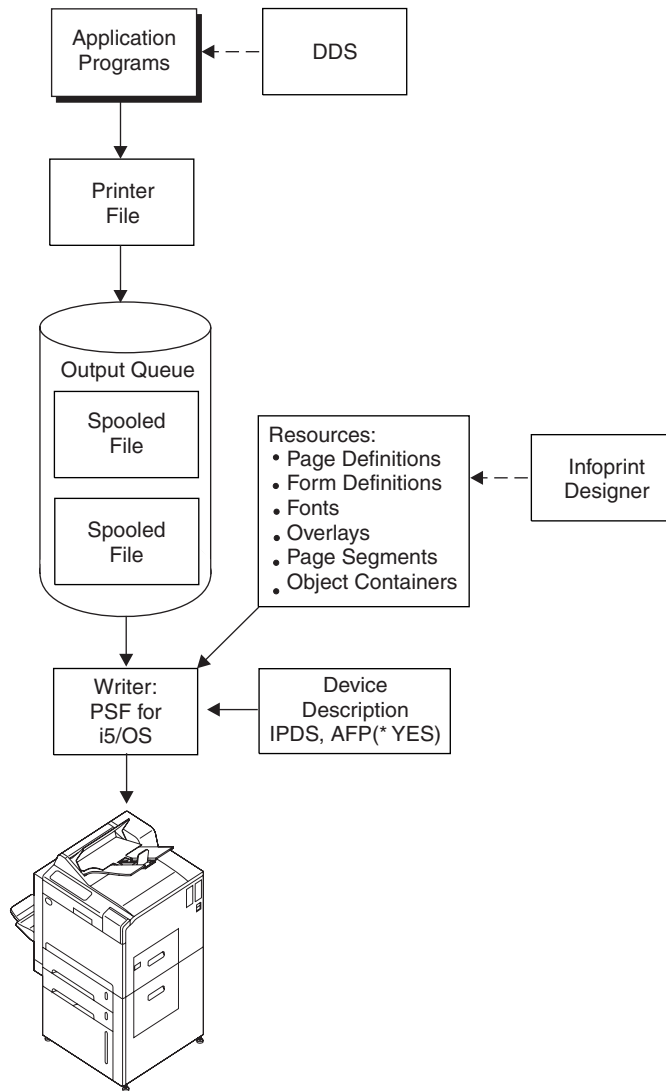
Figure 4. PSF Print Flow

The PSF print flow is described below.

1. **Application programs** generate output that can be either program-described or externally-described. If the output is program-described, then the application program (in RPG or COBOL, for example) formats all of the data on the page one line at a time. The program can produce AFP directly, or it can use an application enabler such as Infoprint Designer to create the output.

   If the output is externally-described, the application program simply creates records. These records are processed by DDS, which is separate source and object code from the RPG or COBOL program.

2. **DDS keywords**, if used, determine how each field of every record from the application program is formatted on the page. Fields can be individually placed on the page in any font or orientation. DDS keywords can be used for many formatting options, such as including bar codes, drawing boxes, and specifying overlays. You can use DDS with or without PSF, but many more formatting capabilities are available with PSF. See Chapter 15, "Using Data Description Specifications," on page 137 for more information.

3. The application program always uses a **printer file**. This is the same printer file used without PSF. Values specified in the printer file determine general

characteristics of the entire print job, such as what printer the job is sent to, whether to print simplex or duplex, whether to print multiple pages per side, and whether to add an overlay to every page.

4. A **spooled file** is created on an output queue, just as it is in the i5/OS print flow. The difference is that an AFP spooled file can contain references to resources. These references can result from the printer file parameters and DDS keywords that were used when the file was created. The resources might be downloadable fonts, overlays, and page segments. Other resources that can be referenced by a spooled file are page definitions and form definitions, even though they are less common in the i5/OS environment. See "Page Definitions and Form Definitions" on page 74 for more information.

5. In the PSF print flow, the **device description** of the printer to which the output is sent specifies a device type of IPDS and also specifies AFP(*YES). This means that the printer is an IPDS device capable of handling all AFP functions, such as downloading resources and printing graphical information from DDS.

6. **PSF** is the printer writer.

   PSF has three primary functions:

   • Take the spooled file off the output queue and perform any necessary data stream transforms on it. The spooled file data type can be SCS, line, IPDS, or AFP, as specified by the printer file. The spooled file must be transformed into the correct printer-specific IPDS data stream.

   • Gather any resources referenced by the spooled file, such as fonts, page segments, and overlays.

   • Send the transformed spooled file and its resources to the printer. Because IPDS is a bidirectional data stream, PSF must also participate in a dialogue with the printer. Through this dialogue, PSF manages error recovery. If printer intervention is required during the job printing, for example, PSF resumes printing at the next page in the job so that no data is lost and the job does not have to be re-sent to the printer.

Printers and PSF

PSF supports the entire family of IBM IPDS printers as well as IPDS printers from other vendors. PSF support might be required or optional, depending upon the particular printer specified.

When PSF Is Required

PSF is required if your printer falls into one of these categories:

• Any TCP/IP attached IPDS printer

• Any Twinax attached IPDS printer that uses PSF functions (specifically, AFP functions such as overlays, fonts, and page segments - see Table 3 and Table 4 on page 18)

PSF is also required when:

• i5/OS is used to print any line or mixed-mode data.

• You use any of the parameters listed in Table 3 or Table 4 on page 18.

Table 3. Printer File Parameters that Require PSF

AFP characters (AFPCHARS)	Page definition (PAGEDEF)
Back overlay (BACKOVL)[1]	Saddle stitch (SADLSTITCH)
Corner staple (CORNERSTPL)	Table reference characters (TBLREFCHR)

Table 3. Printer File Parameters that Require PSF (continued)

Device type (DEVTYPE=*LINE or *AFPDSLINE)	User-defined data (USRDFNDTA (IPDSPASTHR(*YES│*NO)))
Edge stitch (EDGESTITCH)	User-defined data (USRDFNDTA (IPDSPASTHR(*YES│*NO)))
Font resolution for formatting (FNTRSL)	User-defined data (USRDFNOBJ (*PSFCFG))
Front overlay (FRONTOVL)[1]	User resource library list (USRRSCLIBL(*DEVD))
IPDS pass through (IPDSPASTHR)	
1: requires PSF when printing to a device with type *SCS	

Table 4. DDS Keywords that Require PSF

AFP resource (AFPRSC)	Invoke data map (INVDTAMAP)
Document Index Tag (DOCIDXTAG)	Start page group (STRPAGGRP)
End page group (ENDPAGGRP)	Staple (STAPLE)
Graphic data file (GDF)	Z-fold (ZFOLD)

Chapter 3. AFP Applications

Because AFP is integrated into the iSeries, it is natural that there are many i5/OS applications that work with it. These are the types of applications that you can use to generate and work with AFP:

enabling applications
      Applications that help you generate AFP

complimentary applications
      Applications that work with AFP output or AFP data streams

Enabling Applications

The following list describes the enabling applications and their components.

- **IBM Advanced Function Printing Utilities for iSeries** (AFP Utilities)

  AFP Utilities are a set of three utilities that support the creation of AFP applications. AFP Utilities include:

  - **Overlay Utility**

    With Overlay Utility, you can create electronic overlays on the iSeries to be used in AFP applications. Overlay Utility works on any iSeries terminal, and provides an integrated platform to design, create, and print overlays.

  - **Print Format Utility**

    Print Format Utility is an interactive tool for building AFP output directly from the iSeries database, without writing any application programs. With Print Format Utility, you can quickly create complex electronic output combining variable data, overlays, bar coding, images, and other document elements.

  - **Resource Management Utility**

    Resource Management Utility is a tool to manage the overlay and page segment resources used in AFP applications. With Resource Management Utility, you can create, copy, convert, and print these resources.

  For more information about AFP Utilities, refer to this Web page:

  `http://www.printers.ibm.com/internet/wwsites.nsf/vwwebpublished/afputilhome_i_ww`

- **IBM Infoprint Fonts for Multiplatforms**

  IBM Infoprint Fonts for Multiplatforms (Program Number 5648-E77) includes the outline fonts available with AFP Font Collection for Workstations and OS/400 and the Type Transformer and Utilities optional feature, which enables you to edit and manage fonts. This product contains enhancements to the GUIs available with AFP Font Collection and Type Transformer, as well as enhancements for Eastern European and Asia Pacific languages and more support for China and Japan.

  The Font Installer for AFP Systems feature of Infoprint Fonts for Multiplatforms is recommended for loading TrueType and fonts on your system. For more information about Infoprint Fonts for Multiplatforms, refer to this Web page:

  `http://www.printers.ibm.com/internet/wwsites.nsf/vwwebpublished/ipfontshome_m_ww`

- **AFP Font Collection for Workstations and OS/400**

  AFP Font Collection for Workstations and OS/400 (Program Number 5648–B45) provides font resources for the i5/OS operating environment. In addition to the font resources, an orderable feature of this product (Type Transformer and

Utilities for Windows) provides font utilities that allow you to edit outline fonts, create AFP font resources from Type 1 outline fonts, create and modify code pages, and create and modify coded fonts. DBCS CID-keyed outline fonts are also provided for the Chinese, Japanese, and Korean languages. The Chinese, Japanese, and Korean fonts can be used with Type Transformer to create 240-pel and AFP Outline Font resources. AFP Font Collection comes free with PSF, and the Font Collection fonts are included with Infoprint Designer for iSeries.

You do not typically need every font library installed on your iSeries. See "Which Font Libraries Should I Install?" on page 53 for suggestions about which font libraries to install. "Steps to Restore Font Libraries From the Font Collection or Infoprint Fonts CD to the iSeries" on page 96 has instructions for restoring AFP Font Collection fonts to your iSeries.

IBM iSeries AFP Font Utilities has two commands to help you use fonts from Infoprint Fonts or AFP Font Collection. Use these commands to load the fonts and print a catalog of font samples. For more information about these commands and to download them, refer to this Web page:

`http://www-1.ibm.com/support/docview.wss?uid=tss1flash10380`

For information about Infoprint Fonts, refer to this Web page:

`http://www.printers.ibm.com/internet/wwsites.nsf/vwwebpublished/ipfontshome_m_ww`

For information about AFP Font Collection for Workstations and OS/400, refer to this Web page:

`http://www.printers.ibm.com/internet/wwsites.nsf/vwwebpublished/afpfonthome_m_ww`

- **IBM AFP Printer Driver for Windows**

  The IBM AFP Printer Driver for Windows creates AFP documents, overlays, and page segments from any Windows application. The AFP data stream can be uploaded for printing on the i5/OS, or sent to a file for viewing by the AFP Viewer. You can also use the IBM AFP Printer Driver for Windows to create electronic overlays and page segments for use in your i5/OS AFP documents.

  For more information about the AFP Printer Driver for Windows or to download the driver, refer to this Web page:

  `http://www-1.ibm.com/support/docview.wss?uid=psd1P4000187`

- **Business Graphics Utility (BGU)**

  BGU is an interactive utility for developing graphical data such as graphs and pie charts. The output of BGU, a graphic data file, can be used within an AFP document.

- **Graphical Data Display Manager (GDDM)**

  GDDM is a set of programming routines that can be used to generate graphical data directly from a high-level program. The output of GDDM, a graphic data file, can then be used with AFP output.

- **Infoprint Designer for iSeries**

  Infoprint Designer for iSeries (Program number 5733-ID1), hereafter referred to as Infoprint Designer, has three parts to help you work with your iSeries data: Image Editor, Overlay Editor, and Layout Editor. The Image Editor and Overlay Editor are just that – utilities for editing (and creating) images and overlays. The Layout Editor helps you put it all together. You can use it to seamlessly download spooled files that you have retained from an application run and display them in the Layout Editor for drag-and-drop placement on your electronic forms. If you are migrating from continuous pre-printed forms with each page identically embossed, you only need to do minimal reformatting to fine tune the layout. With Infoprint Designer's graphical design capability, it

makes the application-independent formatting easier, and you can produce layout projects with or without electronic forms in the background.

Starting in version 1.11 (provided with PTFs SF67603 and SF67604), Infoprint Designer comes with a layout wizard, which makes it easier for you to create complex layouts in the Layout Editor. Use the Layout wizard to help you create layouts with modified copies, with different formats on the front and back of a duplexed sheet, or that use conditional processing to change layouts from page to page in a print job.

For information about Infoprint Designer, refer to this Web page:

`http://www.printers.ibm.com/internet/wwsites.nsf/vwwebpublished/ipdesignerhome_i_ww`

Complementary Applications

- **Infoprint Server for iSeries**

  Infoprint Server for iSeries (Program Number 5722–IP1) provides the abilities to e-mail i5/OS spooled files (as PDF files) and consolidate network printing on the iSeries with its PostScript, PCL, and PDF to IPDS print transforms. It also includes image transforms to convert PC-based gif, tiff, and jpeg images to AFP page segments, overlays, or documents. With its Create AFP Data (CRTAFPDTA) command, you can add index tags to line or AFP data. The PDF subsystem lets you convert a spooled file to PDF then store it as a stream file, put it on an output queue, or e-mail it.

  For more information about Infoprint Server for iSeries, refer to this Web page:

  `http://www.printers.ibm.com/R5PSC.NSF/Web/ipserv400Home`

- @server **iSeries Access for Windows**

  @server iSeries Access for Windows, hereafter referred to as iSeries Access, lets you connect i5/OS systems and personal computers running a variety of Microsoft® Windows operating systems. iSeries Access offers an all-inclusive client solution for accessing and using resources from your Windows desktop. It includes 5250 emulation, access to DB2 Universal Database™ (UDB) for iSeries through its Data Transfer, and utilizes AS/400 NetServer for working with the i5/OS Integrated File System and printers. It has several components, including iSeries Navigator and AFP Workbench Viewer.

  – **AFP Workbench Viewer**

    Provides a high-function client interface to iSeries output. You can view any spooled file fully and graphically, including AFP output. Once viewed, output can be searched, faxed, and printed.

  – **iSeries Navigator**

    IBM iSeries Navigator is a graphical interface for managing your iSeries servers. With V5R2, iSeries Navigator implements an interactive interface to PDF and e-mail functions, enabling you to select one or more print files and define immediate PDF and e-mail options. iSeries Navigator also includes AFP Manager, which helps you create and manage AFP objects.

  For more information about iSeries Access, refer to this Web page:

  `http://www-1.ibm.com/servers/eserver/iseries/access/`

- **iSeries Access for Web**

  iSeries Access for Web is the Web browser version of iSeries Access. It provides many of the functions supported by iSeries Access but is installed on the iSeries server and requires only a browser on the client machine. It also integrates with Infoprint Server's PDF support to display and print iSeries spooled files in PDF format.

  For more information about iSeries Access for Web, refer to this Web page:

```
http://www-1.ibm.com/servers/eserver/iseries/access/web/
```

- **IBM Toolbox for Java**

  The IBM Toolbox for Java™ is a library of Java classes supporting the client/server and internet programming model to an iSeries or AS/400 server. The classes can be used by Java applets, servlets, and applications to easily access server data and resources. IBM Toolbox for Java provides support similar to functions available when using the iSeries Access APIs. With V5R2, the Toolbox includes an access method for duplicating spooled files. This enables dynamic interfaces to PDF functions. For more information about this method, see "Accessing the PDF Subsystem" on page 215.

  For more information about IBM iSeries Toolbox for Java, refer to this Web page:

  ```
  http://www-1.ibm.com/servers/eserver/iseries/toolbox/
  ```

- **AFP Viewer Plug-in**

  The AFP Viewer Plug-in is a downloadable plug-in to Microsoft Internet Explorer or Netscape Navigator. It lets you view any spooled file fully and graphically, including AFP output. Once viewed, output can be searched, faxed, and printed.

  You can download the AFP Viewer Plug-in free from IBM at:

  ```
  http://www-1.ibm.com/support/docview.wss?rs=95&context=SRNPPZ&dc=D400&q1=psd1*&uid=psd1P4000233&loc=en_US&cs=utf-8&lang=en
  ```

- **Facsimile Support for iSeries**

  Facsimile Support for iSeries enables you to use facsimile, or fax, directly from an iSeries system. It is a generalized facsimile enabler for both inbound and outbound faxes that lets you integrate your facsimile transmissions directly into your applications.

  Incoming faxes can be viewed using iSeries Access or printed on IPDS printers. Any *SCS or *AFPDS iSeries spooled file can be faxed outbound. Facsimile Support also supports AFP overlays as fax cover sheets (for *AFPDS spooled files only).

  For more information, refer to this Web page:

  ```
  http://www-1.ibm.com/servers/eserver/iseries/fax400/
  ```

- **Content Manager ImagePlus**

  Content Manager ImagePlus® enables you to turn paper documents into electronic images that then can be stored, viewed and printed. ImagePlus provides the ability to electronically capture, import, index, store, retrieve, display, process, distribute, and print image information.

- **ImagePlus Workfolder Application Facility (WAF/400)**

  ImagePlus Workfolder Application Facility (WAF) provides an application for document-driven workflow and folder management. WAF also provides a set of APIs for the image enablement of business applications. WAF documents, being image-coded data, can be viewed with the iSeries AccessViewer and printed on IPDS printers.

- **Content Manager OnDemand for iSeries (OnDemand)**

  OnDemand offers online document capture, indexing, storage, and retrieval of large volumes of electronic data, such as AFP spooled files. This data can be stored on disk, optical, or tape storage media. Once stored, you can view, print or fax individual, selectively retrieved segments of the spooled file, such as an individual invoice or department report.

  For more information, refer to this Web page:

  ```
  http://www.ibm.com/software/data/ondemand/400
  ```

- **Business Partner Applications**

The second category includes applications that work with or transform AFP data. These include report archive and retrieval systems that index, store, manage, and retrieve output files. These also include various print serving systems that route, transform and print i5/OS output.

- **Backup Recovery and Media Services (BRMS)**

  Backup Recovery and Media Services (BRMS) for iSeries provides backup, recovery, and archive services for tape devices. iSeries objects, libraries, folders, spooled files, configurations, and Integrated File System data can be saved, restored, and archived to tape. Output queues can be backed up, including external print resources (overlays, page segments) referenced in AFP spooled files.

  For more information about BRMS, refer to the iSeries Information Center.

- **Third Party Design Tools**

  There are a number of tools that enable you to design and work with AFP resources, such as overlays, fonts, page segments, page definitions, and form definitions. Some of these products are listed below. For more information about these products, refer to the appropriate Web site.

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

  `http://www.g1.com/doc1/`

  .

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

  `http://www.elixir.com/products.htm`

  .

  Papyrus

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

  StreamServe

      The StreamServe Business Communication Platform provides advanced Distributed Output Management capabilities to help reduce the cost of print and fax. For more information about StreamServe, refer to this Web site:

  `http://www.streamserve.com/`

Chapter 4. Introduction to Printer Files

Printer files, both system provided and user created, help you specify how your output appears on the page. In a printer file you can specify such options as overlays to be used, whether the document is printed duplex, number of lines per inch, and to which output queue the spooled file is sent.

Printer files can contain two different types of information: parameters that apply to the entire spooled file and control how spooled file data is processed; and printer DDS, which defines how application data is positioned on the output page. The printer file parameters are part of any printer file on the system. Printer DDS is optional and exists only if the application program has externally-described output. For information about using DDS in printer files, see "Printer File DDS" on page 137.

Every job on the i5/OS has an associated printer file, whether or not you create one.

Note: Jobs that do not have an option to generate spooled output do not require printer files. However, every application that generates spooled output must use a printer file to do so.

Refer to the iSeries Information Center for a list of printer file parameters.

Printer File Flow

Because most application output on i5/OS is spooled, you have two opportunities to affect how your output looks:

1. Before the application builds the spooled file
2. While the spooled file is on the output queue waiting to be printed

To affect how your output is handled before from the application program creates the spooled file, use one of these commands prior to processing the application:

Create Printer File (CRTPRTF)
Creates a new printer file.

Change Printer File (CHGPRTF)
Permanently changes the printer file.

Override with Printer File (OVRPRTF)
Temporarily changes the print parameters to be used by the application program for your session. This is the more commonly used of the three commands because the changes are temporary and do not affect other users. Figure 5 on page 26 shows the opening screen for the OVRPRTF command.

```
                   Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 File being overridden  . . . . .              Name, *PRTF
 Overriding to printer file . . .   *FILE      Name, *FILE
   Library  . . . . . . . . . . .              Name, *LIBL, *CURLIB
 Device:
   Printer  . . . . . . . . . . .              Name, *SYSVAL, *JOB
 Printer device type  . . . . . .              *SCS, *IPDS, *USERASCII...
 Page size:
   Page length  . . . . . . . . .              .001-255.000
   Page width . . . . . . . . . .              .001-378.000
   Measurement method . . . . . .   *ROWCOL    *ROWCOL, *UOM
 Lines per inch . . . . . . . . .              3, 4, 6, 7.5, 7,5, 8, 9, 12
 Characters per inch  . . . . . .              5, 10, 12, 13.3, 13,3, 15...
 Front margin:
   Offset down  . . . . . . . . .              0-57.790, *DEVD
   Offset across  . . . . . . . .              0-57.790

                                                              More...
 F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display        F24=More keys
```

Figure 5. Override with Printer File (OVRPRTF) Command

To change spooled file attributes after the file has been spooled, issue Change
Spooled File Attributes (CHGSPLFA). This lets you change attributes such as to
which output queue the output file is spooled and whether the spooled file is
saved.

Figure 6 shows the display that opens when you use the CHGSPLFA command.

```
                  Change Spooled File Attributes (CHGSPLFA)

 Type choices, press Enter.

 Spooled file . . . . . . . . . .              Name, *SELECT
 Job name . . . . . . . . . . . .   *          Name, *
   User . . . . . . . . . . . . .              Name
   Number . . . . . . . . . . . .              000000-999999
 Spooled file number  . . . . . .   *ONLY      1-999999, *ONLY, *LAST, *ANY
 Job system name  . . . . . . . .   *ONLY      Name, *ONLY, *CURRENT, *ANY
 Spooled file created:
   Creation date  . . . . . . . .   *ONLY      Date, *ONLY, *LAST
   Creation time  . . . . . . . .              Time, *ONLY, *LAST
 Select files for:
   User . . . . . . . . . . . . .   *CURRENT   Name, *CURRENT, *ALL
   Print device . . . . . . . . .   *ALL       Name, *ALL, *OUTQ
   Form type  . . . . . . . . . .   *ALL       Form type, *ALL, *STD
   User data  . . . . . . . . . .   *ALL       User data, *ALL
 Printer  . . . . . . . . . . . .   *SAME      Name, *SAME, *OUTQ
 Print sequence . . . . . . . . .   *SAME      *SAME, *NEXT
                                                              More...
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 6. Change Spooled File Attributes (CHGSPLFA) Command

Printer File Parameters

Printer file parameters provide a wide range of printing functions, from the basics
of managing the spooled file to options that will transform simple line output to
advanced electronic output.

With spooled file-level parameters you can specify the following and more:
• The output queue to use.

- Whether a spooled file is saved or held.
- The printer device or device type used, including changing from one type of printer to another (for example, SCS to IPDS).
- The input drawer and output bin, for page printers.
- Simplex or duplex.
- Whether to automatically convert line data to AFP. The AFP spooled file can be viewed and can be printed on more types of printers.

You can use the parameters affecting printed lines to specify these values and more:
- The default font for printed output.
- Characters per inch (CPI) and lines per inch (LPI).
- Page size and page rotation.
- Front and back margins or offsets for the printed lines.

With AFP and printer file options, you can transform simple line output to advanced, full-page documents. You can do this and more:
- Add front and back overlays to your output, including a constant back overlay.
- Print your output in 2-up, 3-up, or 4-up page formats.
- Reduce the output size so that, for example, it can be printed on 8-1/2 by 11 inch paper.
- Use the line data, page definition, and form definition parameters to completely transform the application output. Chapter 16, "Using Infoprint Designer," on page 165 describes how to build page definitions and form definitions.
- Specify finishing operations, including stapling and punching.
- Specify an e-mail address to which transformed data is sent. This requires Infoprint Server.

During the printing process, not all of the printer file parameters can be used both before and after print spooling. For more information about printer file parameters, refer to the iSeries Information Center.

Using Printer Files to Enhance Your Output

There are several ways to enhance your output with printer files. This section describes how to do these tasks:
- "Specifying Line and Font Changes"
- "Specifying Multi-Up Printing" on page 29
- "Specifying Computer Output Reduction" on page 30
- "Adding Overlays" on page 32
- "Converting Line Data to AFP" on page 34
- "Specifying Finishing Operations" on page 36

Specifying Line and Font Changes

You can modify the appearance and spacing of application output by using the line, character, and font parameters in the printer file. Different combinations of the LPI and CPI parameters let you change the line and character spacing.

You can modify the default font used for spooled file output in these ways:
- By specifying a printer-resident font using the FONT parameter.
- By specifying a host-resident font. You can specify a host-resident font by using the coded font (CDEFNT) or by using the font character set (FNTCHRSET). The

coded font maps to a specific code page and character set. With FNTCHRSET, you specify the code page and character set explicitly.

Use the LPI, CPI, FONT, CDEFNT, and FNTCHRSET parameters in the printer file to control line spacing, character spacing, and fonts. The appropriate parameters are shown in bold in the below displays:

```
                     Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 File being overridden  . . . . .                  Name, *PRTF
 Overriding to printer file . . .   *FILE          Name, *FILE
   Library  . . . . . . . . . . .                  Name, *LIBL, *CURLIB
 Device:
   Printer  . . . . . . . . . . .                  Name, *SYSVAL, *JOB
 Printer device type  . . . . . .                  *SCS, *IPDS, *USERASCII...
 Page size:
   Page length  . . . . . . . . .                  .001-255.000
   Page width . . . . . . . . . .                  .001-378.000
   Measurement method . . . . . .   *ROWCOL        *ROWCOL, *UOM
 Lines per inch . . . . . . . . .                  3, 4, 6, 7.5, 7,5, 8, 9, 12
 Characters per inch  . . . . . .                  5, 10, 12, 13.3, 13,3, 15... Front margin:
   Offset down  . . . . . . . . .                  0-57.790, *DEVD
   Offset across  . . . . . . . .                  0-57.790

                                                                    More...
 F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display       F24=More keys
```

Figure 7. Override with Printer File Display - First Screen

```
                     Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 Back margin:
   Offset down  . . . . . . . . .                  0-57.790, *FRONTMGN, *DEVD
   Offset across  . . . . . . . .                  0-57.790
 Overflow line number . . . . . .                  1-255
 Fold records . . . . . . . . . .                  *NO, *YES
 Unprintable character action:
   Replace character  . . . . . .                  *NO, *YES
   Replacement character  . . . .   ' '            40-FE
 Align page . . . . . . . . . . .                  *NO, *YES
 Source drawer  . . . . . . . . .                  1-255, *E1, *FORMDF
 Output bin . . . . . . . . . . .                  1-65535, *DEVD
 Font:
   Identifier . . . . . . . . . .                  Character value, *CPI...
   Point size . . . . . . . . . .   *NONE          0.1-999.9, *NONE
 Form feed  . . . . . . . . . . .                  *DEVD, *CONT, *CUT, *CONT2...
 Print quality  . . . . . . . . .                  *STD, *DEVD, *DRAFT, *NLQ...
                                                                    More...
 F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display       F24=More keys
```

Figure 8. Override with Printer File Display - Second Screen

```
                    Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 Font character set:
   Character set  . . . . . . . .              Name, *FONT
     Library  . . . . . . . . . .    *LIBL     Name, *LIBL, *CURLIB
   Code page  . . . . . . . . . .              Name
     Library  . . . . . . . . . .    *LIBL     Name, *LIBL, *CURLIB
   Point size . . . . . . . . . .   *NONE      0.1-999.9, *NONE
 Coded font:
   Coded font . . . . . . . . . .              Name, *FNTCHRSET
     Library  . . . . . . . . . .    *LIBL     Name, *LIBL, *CURLIB
   Point size . . . . . . . . . .   *NONE      0.1-999.9, *NONE
 Page definition  . . . . . . . .              Name, *NONE
   Library  . . . . . . . . . .      *LIBL     Name, *LIBL, *CURLIB
 Form definition  . . . . . . . .              Name, *NONE, *DEVD
   Library  . . . . . . . . . .      *LIBL     Name, *LIBL, *CURLIB
 AFP Characters . . . . . . . . .              Name, *NONE
               + for more values
                                                              More...
 F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display       F24=More keys
```

Figure 9. Override with Printer File Display - Third Screen

Specifying Multi-Up Printing

Multiple-up printing lets you print several logical pages on a single physical page. This offers significant advantages in cost and volume of printed reports. Combining this function with duplex printers doubles its value.

The MULTIUP parameter works with the LPI, CPI, PAGRTT, and PAGSIZ parameters of the spooled file and uses the most appropriate printer-resident fonts to fit the logical pages onto an 8-1/2 by 11 inch page with 1/2-inch margins.

Many printers support oversize paper stock such as 11 by 17 inch paper. You can print two full size 8-1/2 by 11 inch pages on 11 by 17 inch paper by specifying MULTIUP (2) and REDUCE (*NO).

Figure 10 on page 30 shows an example of multi-up printing. 4-up printing might push the limits of readability, but it may be the right solution for certain high-volume reports. Adding an overlay also can improve the look and readability of the report.
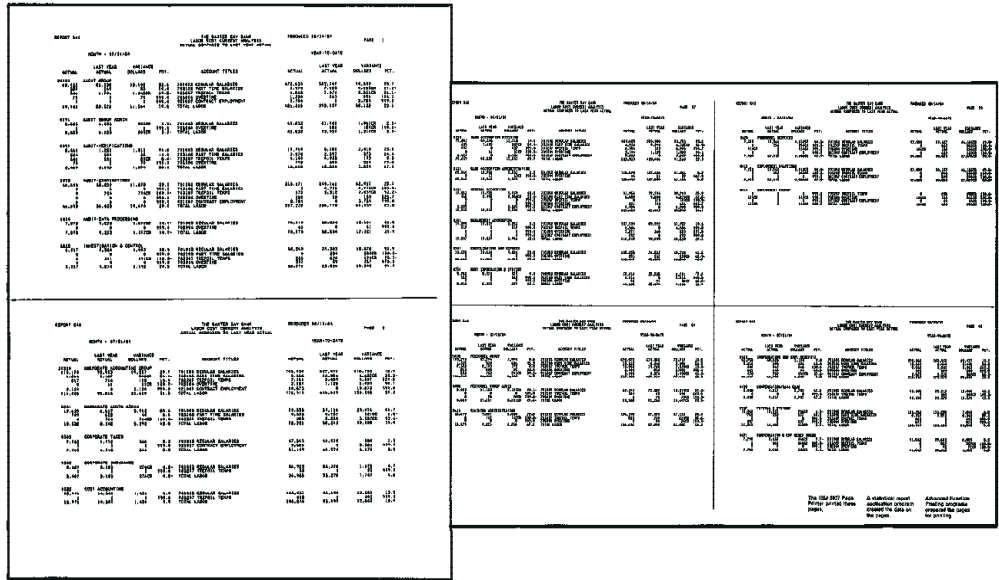
Figure 10. Multi-Up Printing: Example of 2-up and 4-up Printing

Specify a value in the range 1-4 for MULTIUP in the printer file to use this function. The Pages per side parameter is shown in bold in Figure 11:

```
                    Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 Table Reference Characters . . .              *NO, *YES
 Degree of page rotation  . . . .              *AUTO, *DEVD, *COR, 0, 90...
 Pages per side . . . . . . . . .              1-4
 Reduce output  . . . . . . . . .              *TEXT, *NONE
 Print text . . . . . . . . . .
 Hardware justification . . . . .              0, 50, 100
 Print on both sides  . . . . . .              *NO, *YES, *TUMBLE, *FORMDF
 Unit of measure  . . . . . . . .              *INCH, *CM
 Front side overlay:
   Overlay  . . . . . . . . . . .              Name, *NONE
     Library  . . . . . . . . . .     *LIBL    Name, *LIBL, *CURLIB
   Offset down  . . . . . . . . .   0          0-57.790
   Offset across  . . . . . . . .   0          0-57.790




                                                              More...
 F3=Exit    F4=Prompt    F5=Refresh    F10=Additional parameters    F12=Cancel
 F13=How to use this display        F24=More keys
```

Figure 11. Override with Printer File Display - Pages Per Side

Specifying Computer Output Reduction

Computer output reduction (COR) automatically takes standard reports on computer paper and reduces them to fit on 8-1/2 by 11 inch paper. COR is designed to handle reports created at 66 lines per page and 132 print positions per line.

See Figure 12 on page 31 for an example of the COR function.

```
******  3/12/96                                  SUPER SUN SEEDS    CUSTOMER LIST
CUST#    CUSTOMER NAME               CL  X  C  SALESMAN         DTECST    SALES YTD   LSTSAL  CONTACT               PHONE NUM
-------  ----------------------      --  -  -  -------------    ------    ---------   ------  --------------------  ----------
000100   IMPROVED PRINTING CORP      EZ  Y  X  YOUR PRINTER REP 060352     3,182.00   093052  IBM PRINTER PROSPECT  37644912:
000101   SUPER SEEDS                 EZ  Y  X  BURT SEED        011052     1,193.50   092859  STARK SUPERSEED       123567009
000102   PLEASANT PLANTS             IO  Y  X  JOHNNY JONES     030959       923.70   091063  MARGE FIELD           90757629:
000103   PETE'S PLANTS               OJ  Y  X  CHRIS SEEDER     030455        23.96   092057  PETER GREENTHUMB      45898899:
000104   TREE AND SHRUB EMPORIUM     IO  Y  X  PATRICIA PEACH   030354       589.36   081955  WILLIAM ACRES         48484710:
000105   VERN'S FERNS                PJ  Y  X  MICHEAL ELMWOOD  121254        26.06   091257  VERNON ARBOL          12341234:
000106   POLLY'S PLANTS              EZ  Y  X  DANIEL WATERLILY 023058    10,890.00   042361  POLLY ASPENTREE       54432120:
000107   BEN'S EXOTIC SEED SUPPLY    EZ  Y  X  VICTOR PLANTA    052054       108.73   101056  BENJAMIN S. SEEDLING  23845590:
000108   EZ GROWTH NURSERY           EZ  Y  X  MICHELE GOODACRE 040854       630.92   101256  EARNEST TREEMASTER    23900112:
000109   TREE'S ARE US               PG  Y  X  MARY PINETREE    070960        93.30   112161  SHERMAN OAKTREE       23943901:
000110   SOUTHWESTERN SEED SUPPLY    IQ  Y  X  SUNNY SMITH      031059       492.90   120362  JOHN E. APPLESEED     23099100:
000111   MIRACLE GROWTH PLANTS       IO  Y  X  PATRICIA PEACH   080762       146.36   090963  MADALINE ASPENGROVE   43364235:
000112   SARAH'S SAFARI FRUITS       OJ  Y  X  MICHEAL ELMWOOD  123069       860.45   010171  SARAH ORANGEMEN       23423407:
000113   RUDY'S RAVASHING RADISHES   PJ  Y  X  CHRIS SEEDER     093067        13.30   031569  RUDY R. AVASHING      12437232:
000114   TRULY TASTY TURNIPS         PG  Y  X  MARY PINETREE    050384       129.57   120486  THEODORE TRULY        97894387:
000115   MEGA GROWTH SQUASH          IO  Y  X  MICHELE GOODACRE 121577     1,284.51   052178  MARYANNE PESCUE       08923489:
000116   PEDRO'S PLEASANT PLANTS     IQ  Y  X  JOHNNY JONES     121483       126.92   061286  PEDRO MARTINEZ        00761233:
000117   FRANK'S FRESH FRUITS        PG  Y  X  PATRICIA PEACH   111567       263.86   031271  FRANKLIN APPLEBY      12514237:
000118   SUPERIOR SEEDS AND SUPPLY   PJ  N  X  BURT SEED        041252   238,856.54   051253  SAMMY SUPERIOR        14232199:
000119   MARTHA'S MERRY MANGO'S      IO  N  X  SUNNY SMITH      071254       550.59   052556  MARTHA SHROEDER       53875639:
000120   MARVELOUS MAPLE TREES       PG  N  X  MICHEAL ELMWOOD  121282     4,026.12   090992  MARVIN SYRUP          12341724:
000121   WILMA'S WILD SEED SUPPLY    EZ  N  X  DANIEL WATERLILY 043255         6.65   012078  WILMA BRUSSELSPROUT   49030670:
000122   THEODORE'S TREE HAVEN       OJ  N  X  VICTOR PLANTA    102957       635.63   120462  THEODORE BIGOAK       12431274:
000123   PENNY LANE PLANTS & SEEDS   IQ  N  X  CHRIS SEEDER     010188       202.12   012188  ROSEMARY TULIP        81236547:
000124   HEALTHY HABITATS            ZZ  N  X  MICHELE GOODACRE 042387       610.13   123190  JP GOODBODY           51098234:
000125   FRAN'S FAMOUS FOLIAGE       EZ  N  X  SUNNY SMITH      041376       239.99   041376  FRANCIS MCDONALD      87132513:
000126   MERLIN'S MAGIC SEEDS        PG  N  X  JOHNNY JONES     102961     4,664.13   013366  MERLIN MCGRATH        09578094:
000127   ANNA'S APPLETREES           IO  N  X  MARY PINETREE    091355    78,097.09   091304  ANNA BANANA           12396787:
000128   BART BARK NURSERY           EZ  N  X  BURT SEED        123070        56.22   012678  BART BARK             09482734:
000129   JAMES JAMAICIAN JUNIPERS    OJ  N  X  PATRICIA PEACH   012874     9,257.25   044376  JAMES GOODFRIEND      45623849:
000130   PISTOL PETE'S PINES         IQ  Y  Y  MICHEAL ELMWOOD  012355        12.32   012756  PETER PINECONE        84318029:
000131   WASHINGTON WATERMELONS      PJ  Y  Y  MARY PINETREE    092979     1,400.63   092303  GEOFF WASHINGTON      63467034:
000132   MIDWESTERN SEED SUPPLY      IO  N  Y  SUNNY SMITH      072368       502.71   102392  JULIAN SEEDLING       45906734:
000133   BREADBASKET SEED EMPORIUM   IQ  Y  Y  JOHNNY JONES     012154       113.94   091272  KATHERINE WHEATHIN    64845456:
000134   JOLLY GIANT VEGGIES         IQ  N  Y  DANIEL WATERLILY 061260    31,803.70   022367  GEORGE GREENVEG       35673567:
000135   ASPARAGUS TO ZUCCHINI       OJ  N  Y  VICTOR PLANTA    011769       114.90   031880  RUTHANNE GOODOATS     70897809:
000136   ORGANIC GARDEN SUPPLIES     EZ  Y  Y  CHRIS SEEDER     012342    20,532.21   051757  ARNOLD GOODSEED       00789670:
000137   FRESH FRUIT SUPPLIES        PG  Y  Z  MICHEAL ELMWOOD  041277        42.04   081283  FRANKLIN LILY         37468945:
000138   ABUNDANT FRUIT & FLOWERS    IO  Y  Z  BURT SEED        101352       142.86   091653  NANCY LOTUS           73904673:
000139   GOOD SEED POTATOES          IO  N  Z  MARY PINETREE    010783     1,190.41   032387  RICHARD POTATOEHEAD   23842398:
000140   GREEN MOUNTAIN FLOWER       IQ  N  Z  SUNNY SMITH      042759    20,377.99   052361  EARL BARNHAUSER       90438275:
000141   LOS ARBOLES DEL MUNDO       PG  Y  Z  MICHELE GOODACRE 121252         2.72   072169  ARMANDO RAMIREZ       89099670:
000142   PLANTAS ROJO & VERDE        EZ  N  Z  JOHNNY JONES     103184     5,599.72   122391  ROSARITA BONITA       47529803:
000143   JUMPING BEANS LIMITED       OJ  N  Z  VICTOR PLANTA    030353         4.98   030353  LAWRENCE HIGHJUMPER   34710293:
000144   LOS ARBOLES GRANDES         IO  Y  Z  PATRICIA PEACH   060656        20.44   060656  LORENZO JUAN          00808080:
000145   STEPHEN'S SEED SWAP         PG  N  Z  MICHEAL ELMWOOD  092390    10,501.70   092292  STEPHEN PEABODY       08096723:
000146   GARDENER'S MARKET           IO  N  Z  PATRICIA PEACH   080072        95.56   041274  JEFFERY GARDENER      90900045:
000147   REDWOOD RANCH & SEED        IQ  Y  Z  MARY PINETREE    010859       120.00   060662  TAMARA FORESTER       46464646:
000148   CLASSIC GARDEN SUPPLIES     IO  Y  Z  CHRIS SEEDER     040467       819.20   062970  MARIA RANCHER         01234567:
```

Figure 12. Example of COR Function

COR output has these properties:
- The new page is in landscape format
- Page margins are 1/2 inch
- Line height is 70% of original
- Printer-resident fonts are substituted to achieve the right line width reduction, as follows:
  - 10 CPI is converted to a 13.3 pitch font
  - 12 CPI is converted to a 15 pitch font
  - 15 CPI is converted to a 20 pitch font
  - 16.67 CPI is converted to a 27 pitch font

Specify REDUCE(*TEXT) in the printer file to use this function. The Reduce output parameter is shown in bold in Figure 13 on page 32:

```
                     Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 Table Reference Characters . . .              *NO, *YES
 Degree of page rotation  . . . .              *AUTO, *DEVD, *COR, 0, 90...
 Pages per side . . . . . . . . .              1-4
 Reduce output  . . . . . . . . .              *TEXT, *NONE
 Print text . . . . . . . . . . .
 Hardware justification . . . . .              0, 50, 100
 Print on both sides  . . . . . .              *NO, *YES, *TUMBLE, *FORMDF
 Unit of measure  . . . . . . . .              *INCH, *CM
 Front side overlay:
   Overlay  . . . . . . . . . . .              Name, *NONE
     Library  . . . . . . . . . .    *LIBL    Name, *LIBL, *CURLIB
   Offset down  . . . . . . . . .  0           0-57.790
   Offset across  . . . . . . . .  0           0-57.790



                                                              More...
 F3=Exit    F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display       F24=More keys
```

Figure 13. Override with Printer File Display - Reduce Output

Adding Overlays

One of the simplest ways to take advantage of AFP is to add overlays to an
application with the printer file. This technique instantly transforms a preprinted
form application into a completely electronic application. Specifying overlays with
a printer file does not provide you with as many functions as those specified with
DDS or with page definitions and form definitions, but for many output
applications, this method is adequate.

Figure 14 on page 33 shows a "greenbar" overlay that can be used to improve the
look and readability of a standard report. This kind of overlay is easy to create and
is easily added using the front and back overlay parameters. Chapter 14, "Using
Printer Files," on page 133 shows a printer file being used to add an overlay to
enhance the Super Sun Seeds output.
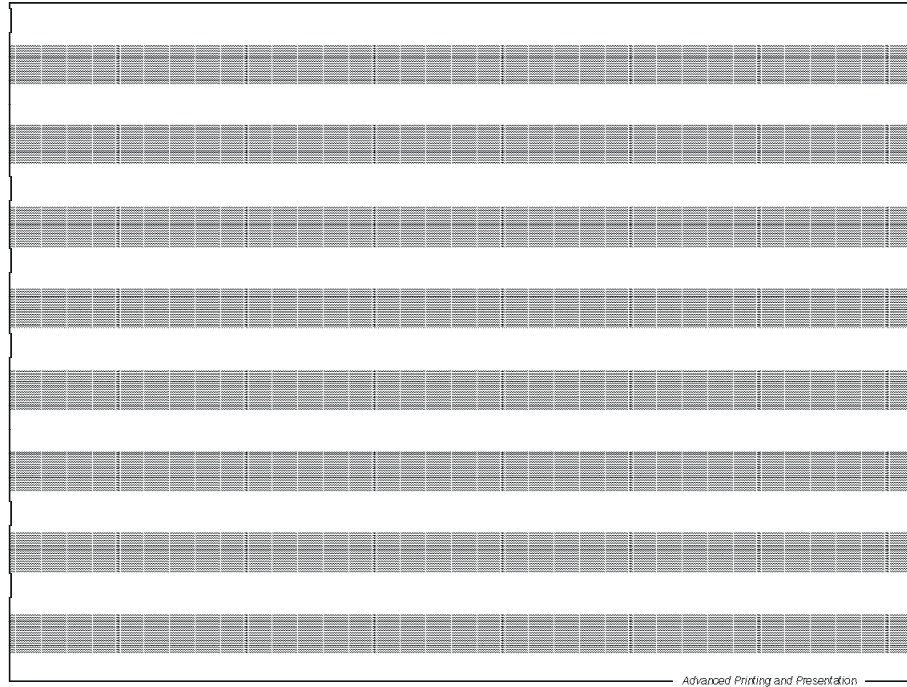
Figure 14. Greenbar Overlay

Use the FRONTOVL and BACKOVL parameters to add an overlay to every page of your output. The overlay parameters are shown in bold in the below displays:

```
                  Override with Printer File (OVRPRTF)

Type choices, press Enter.

Table Reference Characters . . .            *NO, *YES
Degree of page rotation  . . . .            *AUTO, *DEVD, *COR, 0, 90...
Pages per side . . . . . . . . .            1-4
Reduce output  . . . . . . . . .            *TEXT, *NONE
Print text . . . . . . . . . .
Hardware justification . . . . .            0, 50, 100
Print on both sides  . . . . . .            *NO, *YES, *TUMBLE, *FORMDF
Unit of measure  . . . . . . . .            *INCH, *CM
Front side overlay:
  Overlay  . . . . . . . . . . .            Name, *NONE
    Library  . . . . . . . . . .   *LIBL    Name, *LIBL, *CURLIB
  Offset down  . . . . . . . . .   0        0-57.790
  Offset across  . . . . . . . .   0        0-57.790


                                                            More...
F3=Exit    F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
F13=How to use this display        F24=More keys
```

```
                  Override with Printer File (OVRPRTF)

Type choices, press Enter.

Back side overlay:
  Overlay  . . . . . . . . . . .            Name, *FRONTOVL, *NONE
    Library  . . . . . . . . . .   *LIBL    Name, *LIBL, *CURLIB
  Offset down  . . . . . . . . .   0        0-57.790
  Offset across  . . . . . . . .   0        0-57.790
  Constant back  . . . . . . . .   *NOCONSTANT  *NOCONSTANT, *CONSTANT
Convert line data  . . . . . . .            *NO, *YES
IPDS pass through  . . . . . . .            *YES, *NO, *DEVD
User resource library list . . .            Character value, *DEVD...
            + for more values
Corner staple  . . . . . . . . .            *NONE, *BOTRIGHT...




                                                            More...
F3=Exit    F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
F13=How to use this display        F24=More keys
```

Figure 15. Override with Printer File Display - Overlay Parameters

Converting Line Data to AFP

The Convert line data (CVTLINDTA) parameter lets you specify that spooled line
data coming from an application (for example, reengineered applications using
Infoprint Designer) is automatically written as an AFP spooled file. This lets you
take advantage of key functions that are not supported with line data, such as
viewing with the AFP Viewer or printing through Host Print Transform to PCL
printers. The Convert Line Data keyword is new with Version 5.

To use this function, in the printer file specify CVTLINDTA(*YES),
DEVTYPE(*LINE) or DEVTYPE(*AFPDSLINE), and you must specify a page
definition with the PAGDFN parameter. The parameters are shown in bold in the
below displays:

```
                   Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 File being overridden  . . . . .               Name, *PRTF
 Overriding to printer file . . .   *FILE       Name, *FILE
   Library  . . . . . . . . . . .               Name, *LIBL, *CURLIB
 Device:
   Printer  . . . . . . . . . .                 Name, *SYSVAL, *JOB
   Printer device type  . . . . . .             *SCS, *IPDS, *USERASCII...
 Page size:
   Page length  . . . . . . . . .               .001-255.000
   Page width . . . . . . . . . .               .001-378.000
   Measurement method . . . . . .   *ROWCOL     *ROWCOL, *UOM
 Lines per inch . . . . . . . . .               3, 4, 6, 7.5, 7,5, 8, 9, 12
 Characters per inch  . . . . . .               5, 10, 12, 13.3, 13,3, 15...
 Front margin:
   Offset down  . . . . . . . . .               0-57.790, *DEVD
   Offset across  . . . . . . . .               0-57.790

                                                                    More...
 F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display        F24=More keys
```

```
                   Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 Font character set:
   Character set  . . . . . . . .               Name, *FONT
     Library  . . . . . . . . . .   *LIBL       Name, *LIBL, *CURLIB
   Code page  . . . . . . . . . .               Name
     Library  . . . . . . . . . .   *LIBL       Name, *LIBL, *CURLIB
   Point size . . . . . . . . . .   *NONE       0.1-999.9, *NONE
 Coded font:
   Coded font . . . . . . . . . .               Name, *FNTCHRSET
     Library  . . . . . . . . . .   *LIBL       Name, *LIBL, *CURLIB
   Point size . . . . . . . . . .   *NONE       0.1-999.9, *NONE
 Page definition  . . . . . . . .               Name, *NONE
   Library  . . . . . . . . . . .   *LIBL       Name, *LIBL, *CURLIB
 Form definition  . . . . . . . .               Name, *NONE, *DEVD
   Library  . . . . . . . . . . .   *LIBL       Name, *LIBL, *CURLIB
 AFP Characters . . . . . . . . .               Name, *NONE
                + for more values
                                                                    More...
 F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display        F24=More keys
```

```
                   Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 Back side overlay:
   Overlay  . . . . . . . . . . .               Name, *FRONTOVL, *NONE
     Library  . . . . . . . . . .   *LIBL       Name, *LIBL, *CURLIB
   Offset down  . . . . . . . . .   0           0-57.790
   Offset across  . . . . . . . .   0           0-57.790
   Constant back  . . . . . . . .   *NOCONSTANT *NOCONSTANT, *CONSTANT
 Convert line data  . . . . . . .               *NO, *YES
 IPDS pass through  . . . . . . .               *YES, *NO, *DEVD
 User resource library list . . .               Character value, *DEVD...
                + for more values
 Corner staple  . . . . . . . . .               *NONE, *BOTRIGHT...






                                                                    More...
 F3=Exit    F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display        F24=More keys
```

Figure 16. Override with Printer File Display - Convert Line Data

Specifying Finishing Operations

Finishing operations are operations performed on a document as it is being printed and after it is printed. On printers that provide finishing support, Z-fold and nested finishing (stapling pages 6–10 together, for example) happen as the document is printed, stapling and punching the entire document occur after a document has been printed.

Check your printer's manual to determine the level of support provided for each finishing operation. When stapling, neither job nor file separators are stapled to their respective documents.

There are many ways to specify finishing, such as in a form definition, by using DDS keywords, and by printer file keywords. To specify finishing in the printer file, use the CORNERSTPL, EDGESTITCH, or SADLSTITCH parameters. These parameters are shown in bold in the below displays:

```
                 Override with Printer File (OVRPRTF)

Type choices, press Enter.

Back side overlay:
  Overlay  . . . . . . . . . . .                    Name, *FRONTOVL, *NONE
    Library  . . . . . . . . . .      *LIBL         Name, *LIBL, *CURLIB
  Offset down  . . . . . . . . .   0                0-57.790
  Offset across  . . . . . . . .   0                0-57.790
  Constant back  . . . . . . . .   *NOCONSTANT      *NOCONSTANT, *CONSTANT
Convert line data  . . . . . . .                    *NO, *YES
IPDS pass through  . . . . . . .                    *YES, *NO, *DEVD
User resource library list . . .                    Character value, *DEVD...
            + for more values
Corner staple  . . . . . . . . .                    *NONE, *BOTRIGHT...




                                                                 More...
F3=Exit    F4=Prompt    F5=Refresh    F10=Additional parameters    F12=Cancel
F13=How to use this display        F24=More keys
```

```
                 Override with Printer File (OVRPRTF)

Type choices, press Enter.

Edge stitch:
  Reference edge . . . . . . . .                    *NONE, *BOT, *RIGHT, *TOP...
  Reference edge offset  . . . .                    0.0-57.790, *DEVD
  Number of staples  . . . . . .                    1-122, *DEVD
  Staple offsets . . . . . . . .                    0.0-57.790, *DEVD
            + for more values
Saddle stitch:
  Reference edge . . . . . . . .                    *NONE, *TOP, *LEFT, *DEVD
  Number of staples  . . . . . .                    1-122, *DEVD
  Staple offsets . . . . . . . .                    0.0-57.790, *DEVD
            + for more values
Font resolution for formatting                      *DEVD, *SEARCH, 240, 300
Defer write  . . . . . . . . . .                    *YES, *NO
Spool the data . . . . . . . . .                    *YES, *NO
Output queue . . . . . . . . . .                    Name, *DEV, *JOB
  Library  . . . . . . . . . . .      *LIBL         Name, *LIBL, *CURLIB
                                                                 More...
F3=Exit    F4=Prompt    F5=Refresh    F10=Additional parameters    F12=Cancel
F13=How to use this display        F24=More keys
```

Figure 17. Override with Printer File Display - Finishing Parameters

Chapter 5. Introduction to PSF Configuration Objects

A PSF configuration object is an extension of the printer device description. It lets you specify device configuration options that you cannot specify with the device description. For example, you can specify a library list for PSF to use to search for resources, when PSF should release a session with a printer, or whether to automatically take advantage of outline fonts. The PSF configuration object takes on a greatly expanded role with PDF and intelligent routing functions. You can use CL commands or the AFP Manager graphical interface to create and change a PSF configuration object.

When IBM releases new functions for PSF between releases of the licensed program, it might use the PSF configuration object's PSF Defined Option parameter. It is common for the PSF defined option to become a parameter in the PSF configuration object at a later release. When that happens, you might specify the option in both places; as a PSF configuration object parameter and as a PSF defined option. In this case, the value specified in the PSF defined option is used and the value specified in the PSF configuration object parameter is ignored. These are the current values for PSF Defined Option:

AFPOUTQ(library/output_queue_name)
> This has been made a parameter on the PSF configuration object. AFPOUTQ specifies the library-qualified output queue on which to spool the AFP data. This is only valid and is required if AFPSAVE is *YES in the PSF configuration object. The specified output queue must exist when you create the PSF configuration object. PSF tries to lock the queue when it starts the PDF subsystem writer. If it cannot lock the queue, the writer ends.
>
> If there is a PDF mapping program specified in the PSF configuration object, the value specified on the PDF mapping program is used. However, if the PDF mapping program specifies AFP respooling but does not specify an output queue, this AFPOUTQ value is used. If the output queue specified on the PDF mapping program does not exist, the AFP file is spooled to QGPL/QPRINT.

AFPSAVE(*NO|*YES)
> This has been made a parameter on the PSF configuration object. AFPSAVE specifies whether the jobs submitted to the associated writer can be respooled as AFP. You can specify AFPSAVE with any value for PDFGEN in the PSF configuration object, including *NONE. Valid values are:
>
> **<u>*NO</u>**   Jobs submitted to the associated writer cannot be respooled as AFP. This is the default.
>
> ***YES**   Jobs submitted to the associated writer can be respooled as AFP. AFP respool is controlled by the PDF mapping program, the map object, or the AFPRESPOOL parameter on the spooled file's User defined data.

IGCLINEDTA
> IGCLINEDTA changes AFP(*YES) writers to intercept IPDS data before being sent to the printer and verifies that an even number of code points is being sent when a double byte font is in effect. One of these happens:

- If the data contains an odd number of code points, the last code point is X'40', and the active font is a double byte font, then the trailing X'40' is removed.
- If the data contains an odd number of bytes and the last code point is not X'40' the data is not modified and is sent to the printer as-is.

To use this option, enter IGCLINEDTA in the first line of the PSF Defined Options parameter. If you use CHGPSFCFG to change the PSF configuration object, you must specify IGCLINEDTA again.

Notes:

1. IPDSPASTHR must be set to *NO.
2. This will not correct data that is printed using DBCS resident outline fonts. Data using downloaded raster fonts, resident raster fonts, and downloaded outline fonts is supported.
3. This extra processing will increase CPU utilization and might impact printing throughput.

OFFSTACK(*YES | *NO)
OFFSTACK provides a means to disable offset stacking on cut-sheet printers and edge mark printing on continuous forms printers.

OFFSTACK(*YES)
There is no change to offset stacking and edge marking. That is, offset stacking and edge marking occurs between each spooled file. All offset stacking and edge mark changes specified in the form definition are honored. This is the default.

OFFSTACK(*NO)
No offset stacking or edge marking is done. This includes the offset stacking and edge marking that is done between spooled files and through the form definition.

PDFADMIN(e-mail_address)
This has been made a parameter on the PSF configuration object. PDFADMIN specifies the e-mail address of the PDF administrator used with the PDF subsystem of Infoprint Server for iSeries. If there is an error in the conversion to PDF, an e-mail is sent to this address, processing continues, and the original spooled file is held. If possible, the PDF file in error is attached to the e-mail. This parameter is valid if *NONE is not specified for PDFGEN. Valid values are:

*NONE
There is no PDF administrator.

name@domain
The PDF administrator's e-mail address.

This value is most useful when generating multiple PDF files from one spooled file. If there is an error in PDF processing, the PDF file in error is attached and sent to this address. The attachment is given the routing tag's name from the spooled file, if one exists. If not, IBM gives it a default name. For more information about the PDF subsystem and the PDF administrator, refer to *Infoprint Server for iSeries: User's Guide*.

PDFDTAAUT(*INDIR | *RWX | *RW | *RX | *WX | *R | *W | *X | *EXCLUDE)
PDFDTAAUT lets you specify the public data authority for any directories that PSF creates when a mapping program specifies that PDF files are to be

written to the integrated file system. This ability applies to customer-written PDF mapping programs as well as map objects. These are the valid values for PDFDTAAUT:

*INDIR
> The authority for the directory to be created is determined by the directory it is to be created in. The directory immediately preceding the new directory determines the authority.
>
> A directory created in the root (/), QOpenSys, or user-defined file system is assigned the same public, private and primary group authority, authorization list, and primary group as the directory it is to be created in.
>
> A directory created in QDLS for a folder defaults to *EXCLUDE for a first level folder. If created in the second level or greater, the authority of the previous level is used.
>
> The QOpenSys and root (/) file systems use the parent directory Ifs Data Authority value. If the value *INDIR is specified, then PSF specifies the value *INDIR for the *PUBLIC object authority.

*RWX The user can change the object and perform basic functions on the object except those limited to the owner or controlled by object existence (*OBJEXIST), object management (*OBJMGT), object alter (*OBJALTER) and object reference (*OBJREF) authorities. Read, write, execute (*RWX) authority provides object operational (*OBJOPR) and all data authorities.

*RW The user can view and change the contents of an object. Read, write (*RW) authority provides *OBJOPR and data read (*READ), add (*ADD), update (*UPD) and delete (*DLT) authorities.

*RX The user can perform basic operations on the object, such as run a program or display the contents of a file. The user is prevented from changing the object. Read, execute (*RX) authority provides *OBJOPR and data *READ and execute (*EXECUTE) authorities.

*WX The user can change the contents of an object and run a program or search a library or directory. Write, execute (*WX) authority provides *OBJOPR and data *ADD, *UPD, *DLT, and *EXECUTE authorities.

*R The user can view the contents of an object. Read (*R) authority provides *OBJOPR and data *READ authorities.

*W The user can change the contents of an object. Write (*W) authority provides *OBJOPR and data *ADD, *UPD, and *DLT authorities.

*X The user can run a program or search a library or directory. Execute (*X) authority provides *OBJOPR and data *EXECUTE authorities.

*EXCLUDE
> The user cannot access the object. The OBJAUT value must be *NONE, if this special value is used.

The value *NONE is not supported for PDDTAAUT. If you specify a value for PDDTAAUT that is not supported, PSF issues PQT0038 with reason code 5 and terminates. Message PQT0038 is: "Printer writer *writer* ended because of an error." Reason code 5 is "Value not recognized."

PDFMAP(library/pdfmapobject)
> This option has been made a parameter on the PSF configuration object. PDFMAP is used with the PDF subsystem of Infoprint Server for iSeries. It specifies the library-qualified map object to use with the IBM-supplied PDF mapping program. This parameter is only valid if a value other than *NONE is specified for PDFGEN and if *IBMPGM is specified for PDFMAPPGM in the PSF configuration object. The specified map object must exist when you create the PSF configuration object. Valid values are:

> ***NONE**
>> There is no map object.

> *Library-name/PDF-mapping-object-name*
>> Specify the map object to use with the IBM-supplied PDF mapping program. If you specify this value, you must specify PDFMAPPGM(*IBMPGM) in the PSF configuration object. The specified map object must exist when you create the PSF configuration object.

Creating and Changing PSF Configuration Objects

The commands Create PSF Configuration (CRTPSFCFG), Change PSF Configuration (CHGPSFCFG), and Work with PSF Configuration (WRKPSFCFG) let you create, change, and work with PSF configuration objects. To create a PSF configuration object, enter the command CRTPSFCFG along with any parameters on the command line.

Example:

In this example we create a PSF configuration object named EMAILCFG that tells the Infoprint Server PDF subsystem to generate PDF and send it as e-mail. It accepts default values for all other parameters.

```
CRTPSFCFG PSFCFG(EMAILCFG) PDFGEN(*MAIL)
```

Alternatively, enter CRTPSFCFG and press F4 (Prompt), which brings up this screen:
To create the PSF configuration object, fill in the values and press Enter. For help

```
                  Create PSF Configuration (CRTPSFCFG)

 Type choices, press Enter.

 PSF configuration  . . . . . . .                  Name
   Library  . . . . . . . . . .      *CURLIB       Name, *CURLIB
 User resource library list . . .   *JOBLIBL      *JOBLIBL, *CURLIB, *NONE
 Device resource library list . .   *DFT           Name, *DFT
              + for more values
 IPDS pass through  . . . . . . .   *NO            *NO, *YES
 Activate release timer . . . . .   *NORDYF        *NORDYF, *IMMED...
 Release timer  . . . . . . . . .   *NOMAX         1-1440, *NOMAX, *SEC15...
 Restart timer  . . . . . . . . .   *IMMED         1-1440, *IMMED
 APPC and TCP/IP retry count  . .   15             1-99, *NOMAX
 Delay between APPC retries . . .   90             0-999
 Acknowledgment frequency . . . .   100            1-32767
 Printer response timer . . . . .   *NOMAX         5-3600, *NOMAX
 Generate PDF output  . . . . . .   *NONE          *NONE, *SPLF, *STMF, *MAIL
              + for more values
```

Figure 18. Create PSF Configuration Screen

on any field, press F1.

For instructions about using AFP Manager to create or change a PSF configuration object, see "Creating a PSF Configuration Object" on page 232 and "Changing a PSF Configuration Object" on page 233.

Creating a PSF Configuration Object for the PDF Subsystem

Infoprint Server has a PDF subsystem that lets you transform any iSeries spooled file that PSF/400 can print to PDF. The PDF file can then be sent in an e-mail, put on an output queue, stored in the integrated file system, or any combination of those. To use the Infoprint Server PDF subsystem, you must specify something other than *NO for the PSF configuration object PDFGEN parameter, and then specify the PSF configuration object on the device that will be used for the transform, as described in "Using a PSF Configuration Object."

You can also use a PSF configuration object to customize the PDF transform. For more information about using the PDF subsystem, including instructions about setting up the device, information about PSF configuration object parameters, and the steps required to use the PDF subsystem, refer to *Infoprint Server for iSeries: User's Guide*.

Using a PSF Configuration Object

To use a PSF configuration object, specify its name and location on the User Defined Object (USRDFNOBJ) parameter on the device description command (CRTDEVPRT or CHGDEVPRT) for an IPDS printer specified as AFP(*YES).

Example:

In this example, we configure the device named MYPRINTER to reference the PSF configuration object MYPSFCFG. MYPSFCFG is in the library MYLIB.
```
CHGDEVPRT DEVD(MYPRINTER) USRDFNOBJ(MYLIB/MYPSFCFG *PSFCFG)
```

Any device description for an IPDS printer specified as AFP(*YES) can use any PSF configuration object, one that is used by multiple devices or one that is unique to the device. PSF checks for a PSF configuration object when a writer is started.

Chapter 6. Introduction to AFP Resources

AFP documents consist of objects such as fonts, images in the form of page segments or overlays, and bar codes, illustrated in Figure 3 on page 13. Other objects, called page definitions and form definitions, are used by AFP documents to determine the layout of the output. All of these objects are called AFP resources. This chapter introduces these types of resources:

- "AFP Fonts"
- "Images and Graphics" on page 63 (page segment resources)
- "Overlays" on page 67
- "Bar Codes" on page 69
- "Page Definitions and Form Definitions" on page 74
- "Object Containers" on page 80

AFP Fonts

To represent text, you need fonts. The following sections contain information to help you better understand AFP fonts and how they are used on an iSeries system:

- "What is a Font?" gives a general overview of fonts.
- "Font Architecture" on page 49 describes the font objects in more detail.
- "Where AFP Fonts are Stored" on page 53 describes where the font objects on your iSeries reside. It also suggests which font libraries to install.
- "AFP Font Resource Naming Conventions" on page 54 lists font object types and naming conventions to help you find fonts on your system.
- "How PSF Finds an AFP Font" on page 56 describes how PSF searches for a font when you request it in your print job.
- "Where to Get AFP Fonts" on page 61 describes the iSeries font products.
- "i5/OS Font Products" on page 62 lists the font products that provide host-resident fonts.

The iSeries and PSF also support TrueType and OpenType fonts. For information about these types of fonts, see Chapter 7, "Understanding and Working with TrueType and OpenType Fonts," on page 83. For a list of the differences in how AFP and TrueType fonts are specified, managed, and installed, see "Differences Between AFP Fonts and TrueType Fonts" on page 89.

Much of the detail covered in this section relates to specifying fonts in a programming context (for example, within DDS). If you are using a graphical interface such as Infoprint Designer, then you might not have to directly work with font names and structures. If you need more information about fonts and font concepts, refer to *IBM Infoprint Fonts: Font Summary*.

For examples of how to use fonts, see Chapter 8, "Working with AFP Fonts," on page 91.

What is a Font?

A *font* is a combination of these:

- A typeface or style of printable characters

- A group of characters for selection (described in "Font Architecture" on page 49)
- A map that determines which of the selected characters is to be printed or displayed (described in "Font Architecture" on page 49)

A font can include letters, numbers, punctuation marks and special characters. To add variety to your documents, you can include fonts of various sizes, styles, weights, and orientations. Figure 19 shows different fonts used on the sample page.

Figure 19. Fonts on a Sample Page

There are many different ways to categorize a font, including how the font looks, its structure, and its location in the system. "Create a Document with Several Fonts" on page 91 gives an example of specifying different types of fonts with DDS.

These determine how a font looks:

Font Family Defines a font's overall "look". Courier, Helvetica, Times Roman, and Sonoran Serif are examples of font families.

Typeface A typeface defines the shape of the characters within a font family. It includes their weight, posture, and size or point size.

Weight Defines the character weight such as medium or bold.

Posture Defines the character stance, such as normal or italic.

Spacing There are three different ways a font can be spaced:

Monospaced
> Each character in a monospaced font has the same width and occupies the same print space. Monospaced fonts are also called *fixed-pitch* and *uniformly spaced* fonts. Monospaced fonts are typically used for tabular data because they are easily aligned in columns. Courier is a typical typeface that is normally monospaced.
>
> Many printers have resident monospaced fonts. These can be raster or outline fonts.

Proportional
> Proportionally spaced fonts contain characters with different widths. Narrow characters such as "i" and "l" print with less space than wider characters such as "m" and "A". All proportionally spaced fonts use consistent widths for each character so an "i" in one proportional font is the same width as an "i" in another proportional font.
>
> The average spacing of a proportionally spaced font is 12 characters per inch (cpi). Proportionally spaced fonts can be either raster or outline fonts.

Typographic
> Typographic fonts have variable character widths, but unlike proportionally spaced fonts, each character in each font is individually sized for readability. Typographic fonts can be either raster or outline fonts.
>
> Generally, typographic fonts are more easy to read. They also allow a greater number of characters to be printed on a page.

Size
There are two different ways to specify a font's size, depending on its spacing. For a monospaced font, it is specified in cpi. For a typographic font, size is measured in *point size*. Point size is a vertical measurement used to define the relative size of a font. This is measured from baseline to baseline for the entire font, thus, a "short" character, such as "a", might have a smaller point size than that of the font. One point equals 1/72 of an inch.

A font's **structure** can make a visual difference, but creates differences in many other ways as well. There are two different structures for a font; raster and outline.

Raster font
> A raster font defines characters by bit patterns. Each bit pattern has a specific size, weight, style, and resolution (240 or 300 dpi). Figure 20 illustrates two font characters formed by raster patterns. The character on the right contains more pels, meaning that it has a higher resolution than the character on the left.

Figure 20. Raster Font Characters with Different Resolutions

A different font must be created for each character in each resolution, size, and style required. If we assume that each style and weight is available in point sizes 6 through 12, 14, 16, 20, 24, 30, and 36, then the capital letter A in the Helvetica font family, for example, is stored as 52 different bitmaps. The raster version of the Helvetica font family contains more than 400® different characters, each of which is represented by 52 bitmaps.

Outline font

An outline font (or *scalable font*) defines each character in terms of its outline, using mathematical formulas to define each character's shape. A rasterizer interprets the data and fills in the outline with dots. This creates a bitmap of the character for the specified point size and print resolution.

Outline fonts from IBM define characters using a 1000 x 1000 matrix. The outlines are size and resolution independent and thus can be scaled to any resolution and point size. They can also be specified in any of four orientations: 0, 90, 180, and 270 degrees. Typically, you want a character's proportions maintained when you scale it. Sometimes, however, you might want to stretch or compress a character without maintaining the font's original proportions. This provides for short, fat characters, or for tall, skinny characters. See "Anamorphic Font Character Scaling" on page 96 for information.

No AFP outline fonts come with the iSeries base operating system. The standard set of iSeries outline fonts is provided by IBM Infoprint Fonts (IBM product ID 5648-E77).

Fonts can be presented in several different **orientations**.

Orientation The orientation is the direction the font is presented on the page. All font character sets support four print orientations, 0, 90, 180, and 270 degrees. Other orientations can be printed if the text is created as image data or if outline fonts are used.

The iSeries supports two **locations for a font** to be stored: in the printer (printer-resident) or on the iSeries server (host-resident). Where your font is stored can determine when it is used and how you call it.

Printer-resident fonts

Printer-resident fonts permanently reside in the printer. These can be raster or outline fonts and vary by printer type and manufacturer. Refer to your printer's documentation (or print the resident fonts from the printer control panel) to determine what resident fonts it supports. You use Font Global Identifiers (FGIDs) to access these fonts. FGIDs are discussed in "Font Architecture" on page 49.

Host-resident fonts

AFP host-resident fonts reside on the i5/OS system in libraries, and they are downloaded to IPDS printers as needed. The font libraries on your system are listed in Appendix A, "iSeries Font Libraries," on page 253. Host-resident fonts are identified by a character set and code page or a coded font name (these objects are discussed in "Font Architecture" on page 49).

When a printer needs a host-resident font, PSF handles the download. Downloaded fonts ensure consistent fidelity of each document, regardless of what printer is used (or in the case of the

Infoprint Server PDF subsystem, what viewer or output device is targeted). To avoid unnecessary downloads, you can enable *font capturing*, which lets the printer hold a host-resident font until that space is needed.

When you add a new font to the system (for example, by using the Type Transformer option of AFP Font Collection or Infoprint Fonts), any printer that supports downloadable fonts and matches the resolution of the font (if applicable) can use it immediately if requested by an application. Most current IBM printers support IPDS downloadable outline and raster fonts. Refer to your printer's documentation to determine whether your printer supports downloadable fonts.

Font Architecture

To fully understand fonts and how to use them, you need to understand their underlying architecture. Each font technology has its own architecture. We will introduce the different font technologies supported on the iSeries, then describe the iSeries font architecture.

Font Technologies

There are two types of font technologies used on the i5/OS.

TrueType and OpenType Fonts

Due primarily to the extensive operating system support and its popularity for PC applications, TrueType is probably the most prevalent font technology in the industry today. For information about TrueType and OpenType fonts on the iSeries, see Chapter 7, "Understanding and Working with TrueType and OpenType Fonts," on page 83.

Terminology Note: In this document, the term *TrueType* applies to both TrueType and OpenType fonts, unless otherwise specified.

AFP Fonts

AFP fonts (also known as FOCA fonts) are the standard fonts used for IPDS output. AFP fonts are made up of a code page and a character set, which are described in greater detail below. All AFP fonts are encoded as either single-byte or double-byte fonts, depending on the language for which they are being used.

Adobe Type 1 Fonts are commonly used with ASCII output data streams (PCL, PostScript, and PDF). They can be transformed to AFP format for use with IPDS output. Type 1 fonts are available from many font vendors.

Encoding Schemes on the iSeries

There are three main ways characters on the keyboard are mapped to the characters in your output, using a single-byte or double-byte system, or a system that encompasses both. Multinational applications need to consider both the encoding used to create the document and the encoding that will be used to print the document.

SBCS (Single-byte character set)

An encoding scheme where a character is identified with a code page that maps the character on your keyboard to the character that is shown in the

output. This encoding is used for languages with alphabetic writing systems, such as English, Greek, and Arabic. Code pages are described below.

DBCS (Double-byte character set)
> An encoding scheme where a character is identified with a code page that uses two bytes of data to map the characters on your keyboard to the character that is shown in the output. Languages with non-alphabetic writing systems, such as Chinese, Japanese, and Korean, require DBCS encoding.

Unicode UTF-16 or UTF-8
> Unicode is the universal standard that defines a single encoding scheme to represent all of the characters used in all of the world's languages. This is one of the major encodings supported in TrueType fonts, and it forms the basis for the TrueType support in AFP systems. The AFP datastream supports Unicode UTF-16 and UTF-8. TrueType fonts are described in Chapter 7, "Understanding and Working with TrueType and OpenType Fonts," on page 83.

AFP Font Architecture

In order to use AFP fonts on the iSeries, you need to understand the AFP font architecture in detail. AFP fonts are encoded in EBCDIC format, and are either SBCS or DBCS. We will first focus on host-resident fonts.

Host-resident fonts are represented by a *character set* and *code page* pair or a *coded font* name. They must be downloaded to the printer device before they can be used. These are the types of font objects on the host:

Character set
> The set of all the characters in a given font. An IBM EBCDIC character set contains up to 196 characters or symbols. It is an object on the iSeries and has a name. For example, C0D0GT10 is the character set for Gothic Text 10 pitch. Downloaded character sets and code pages are always used together in pairs. They identify host-resident fonts.

> The iSeries object type for a character set is *FNTRSC and the attribute is FNTCHRSET. See "i5/OS Font Products" on page 62 to determine what character sets are available. For information about font naming conventions, refer to *IBM Infoprint Fonts: Font Summary*.

Code page
> A code page is a map that equates a code point (the key pressed) to a single character in the character set. It is an object on the iSeries and has a name. A code page can be used with both AFP and TrueType fonts.

> Using the code page's name instead of a number implies the object is host-resident. For example, T1V10037 is code page 37 for USA/Canada English. Downloaded character sets and code pages are always used together in pairs. They identify host-resident fonts.

> For the different code pages supported on the iSeries system, refer to *National Language Support Planning Guide*. For more information abut code pages and a list of code pages provided with the IBM AFP Font Collection, refer to *IBM AFP Fonts: Font Summary for AFP Font Collection*. The iSeries object type for a code page is *FNTRSC and the attribute is CDEPAG. See "i5/OS Font Products" on page 62 to determine which code pages are available. For information about font naming conventions, refer to *IBM Infoprint Fonts: Font Summary*.

Coded font
> A specific code page / character set pair. Coded fonts are host-resident.

To put these concepts together, a code page maps a given code point (or keyboard key) to a specific character within the group of characters available (character set). This is what happens as you enter your text at a workstation:

1. Each keyboard character is translated into a *code point* (in single-byte encoding, a code point is a one-byte hexadecimal value, such as X'C1' to represent the letter A).
2. When the text is printed, each code point is matched to a character ID on the code page you specify.
3. The character ID is then matched to the image of the character in the character set you specify. The image in the character set is the image that is printed in your text.

This structure supports the requirements of different national languages to print different patterns based on the same code point. This is illustrated in Figure 21.
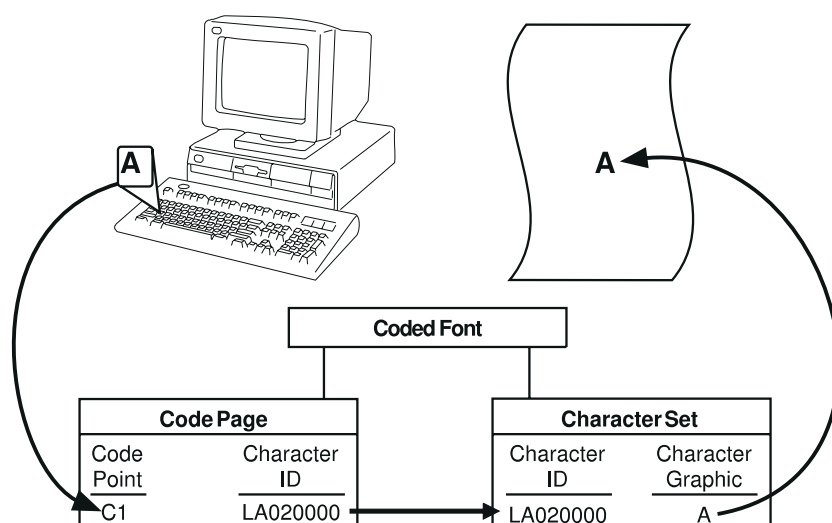
Figure 21. Translation of a Keyboard Character into a Printed Character

The iSeries Font Architecture on International Systems

The same character set (of up to 196 or 256 unique characters) can be used with different code pages to make document creation easier. Those creating documents in Spanish, for example, prefer the 'Ñ' and 'ñ' to be mapped to easily-accessible keys, while those creating documents in another language might want easy access to characters such as 'é', 'ü', 'ç', and others. Use of a code page makes these mapping changes possible. For example, if you press a key and the program you are using translates it to X'4F', you get a different result in your output depending on the code page being used. If you are using EBCDIC code page T1V10037, you get "|". If you are using EBCDIC code page T1V10500, you get "!", and so on. This is illustrated in Figure 22 on page 52. Table 5 on page 52 lists some code point translations. "Create a Document with Several Fonts" on page 91 gives an example of specifying different code pages with DDS.

Table 5. Code Point Translations

EBCDIC Code Page ID	Country or Region	Code Point	Result
37	USA/Canada Country extended code page (CECP)	X'43'	ä
		X'4F'	|
		X'69'	Ñ
		X'9F'	¤
273	Germany F.R./Austria - CECP	X'43'	{
		X'4F'	!
		X'69'	Ñ
		X'9F'	◘
284	Spain/Latin America - CECP	X'43'	ä
		X'4F'	|
		X'69'	#
		X'9F'	◘
500	Multinational #5	X'43'	ä
		X'4F'	!
		X'69'	Ñ
		X'9F'	¤
1141	Germany/Austria - Euro country extended code page (ECECP)	X'43'	{
		X'4F'	!
		X'69'	Ñ
		X'9F'	€

EBCDIC Code Pages
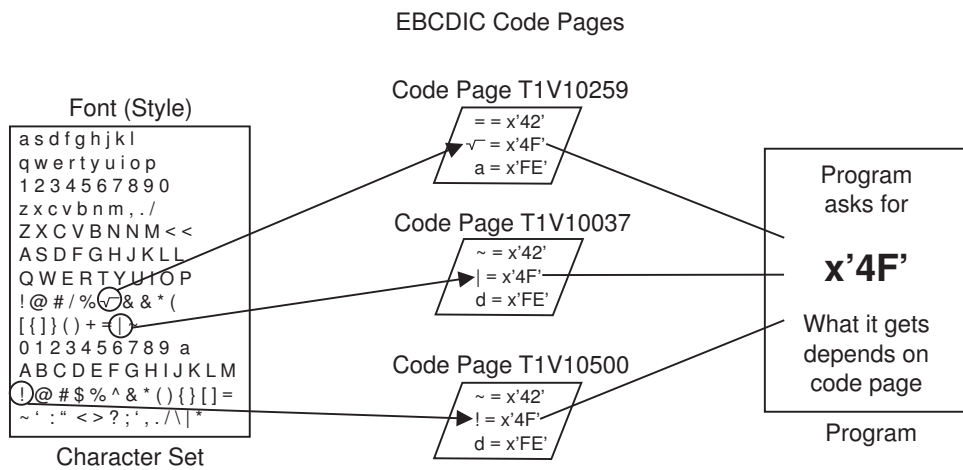
Figure 22. How Code Pages Work

Your system will have a default code page specified, specific to the country or region to which the machine is shipped. To see what your default code page is, enter the command DSPSYSVAL SYSVAL(QCHRID).

In double-byte languages, the map from keyboard to output is somewhat more complicated than with single-byte languages. For outline fonts, a double-byte code page is treated as several single-byte code pages concatenated together and each

character has a double-byte code point. For raster fonts, double-byte code pages are treated as a collection of single-byte code pages. The coded font is divided into sections, each with its own single-byte code page. Each character in the section has a single-byte code point.

Printer-resident fonts

Printer-resident AFP fonts are represented by a *Font Global ID (FGID)*. FGIDs are whole numbers from 1 to 65534 registered within IBM and used to identify font resources. FGIDs are assigned to unique type family/typeface combinations, such as Courier Roman Medium (FGID 11). The printer-resident code page used with an FGID is normally defined by the system default. In the USA, code page 37 is the iSeries default. To determine what your default code page is, enter the command DSPSYSVAL SYSVAL(QCHRID). You can find a complete list of family names, typefaces, attributes, and size of each FGID in the iSeries Information Center. Most laser printers have an option that lets a user print a list of the FGIDs stored in the printer.

In order to ensure document fidelity across various printers, you need to use the same fonts on each printer. If a font is specified in a document but is not resident in the target printer, a substitute font might be used. This can cause output to look different when printed on different printers. See "AFP Font Substitution" on page 58 for more information.

Fonts found in IBM's AFCCU™ printers are the same as the host-resident fonts provided with AFP Font Collection or Infoprint Fonts. This means that printer-resident fonts and downloaded raster fonts can be interchanged in a print environment where both outline font and bitmap printers exist.

Where AFP Fonts are Stored

AFP fonts are stored in font libraries that PSF or another printer driver accesses when it needs a font. When you add fonts to your iSeries from Infoprint Fonts or another product, you need to put the fonts in a place where the printer driver can find them.

Which Font Libraries Should I Install?

The Font Collection CD contains a large number of font libraries that include character sets, code pages and coded fonts for a wide variety of languages and applications. For most users, only a few of those font libraries are normally required. You must decide which font libraries best meet your needs, however, you might want to choose libraries from these commonly used font libraries:

Table 6. Commonly Used Font Collection and Infoprint Fonts Font Libraries

Font Collection or Infoprint Fonts[1] CD File Name	Description	Usual i5/OS Library Name
CPL300	300-pel version of compatibility fonts found in QFNTCPL (which are 240-pel).	QFNT300CPL
LA1300	300-pel version of Latin 1 Fonts.	QFNT300LA1
SYM300	300-pel Symbols character sets. Install this if you have applications that use special symbols.	QFNT300SYM

Table 6. Commonly Used Font Collection and Infoprint Fonts Font Libraries (continued)

Font Collection or Infoprint Fonts[1] CD File Name	Description	Usual i5/OS Library Name
CDEPAG	Additional code pages not found in QFNTCPL. This library is important if you use the AFP Driver for Windows to create overlays.	QFNTCDEPAG
LA1OLN	Outline font version of LA1300.	QFNTOLNLA1
SYMOLN	Outline font version of SYM300.	QFNTOLNSYM
1: Infoprint Fonts does not include raster fonts. Therefore, the file names for raster fonts do not exist on the Infoprint Fonts CD.		

Libraries QFNTCPL and QFNTxx (where xx is 01 to 19 and 61 to 69) are, at print time, automatically included in the active library list. This means that you can store fonts that are needed at print time in the QFNTxx libraries instead of adding their library name to the user or system library list. Because of this, you might want to, for example, change library QFNT300CPL to, QFNT01 (assuming that QFNT01 does not already exist on your system).

See "Steps to Restore Font Libraries From the Font Collection or Infoprint Fonts CD to the iSeries" on page 96 for instructions to restore these font libraries to your iSeries.

IBM iSeries AFP Font Utilities

IBM iSeries AFP Font Utilities is a free tool that you can download to help you load the fonts from Infoprint Fonts or AFP Font Collection fonts onto your iSeries and print a font catalog. This tool includes two commands:

LOADFNTC
> Select the languages and the object types you need. This program builds them into libraries on your iSeries server.

PRTFNTC
> Selectively print fonts from Infoprint Fonts or the AFP Font Collection, or printer resident fonts.

Refer to this Web page for the tool and instructions: `http://www-1.ibm.com/support/docview.wss?uid=tss1flash10380`.

You can look at the fonts supplied in Infoprint Fonts and AFP Font Collection on the Printing Systems Information Center. You can search for a specific font by language family or code page, or you can browse the code pages. The Printing Systems Information Center is at `http://publib.boulder.ibm.com/infocenter/printer/v1r1/index.jsp`.

AFP Font Resource Naming Conventions

Font objects on the iSeries are stored in libraries and have their own object types. Knowing these will help you locate the fonts on your system.

For **code pages**, the object type is *FNTRSC and the attribute is CDEPAG.

For **coded fonts**, the object type is *FNTRSC and the attribute is CDEFNT.

For **font character** sets, the object type is *FNTRSC and the attribute is FNTCHRSET.

Font Character Set Naming Convention

Font character sets are the font resources of which you will most likely need to know the name. Most of the i5/OS font character sets use a common resource naming convention. Understanding these will help you know what fonts to use in your document. For raster font character sets, the format is:

`C0fs0cpp` where:

C0   Designates a raster character set.

f   Designates the font family. For example, `N` is Times New Roman and `H` is Helvetica.

s   Designates the font style as follows:

> **2**: Roman Medium
> **3**: Italic Medium
> **4**: Roman Bold
> **5**: Italic Bold

c   Designates the language complement. For example, `0` is Latin 1 and `1` is Symbols.

pp   Designates the point size as follows:

60: 6-point	00: 10-point	F0: 16-point	T0: 30-point
70: 7-point	A0: 11-point	H0: 18-point	Z0: 36-point
80: 8-point	B0: 12-point	J0: 20-point	
90: 9-point	D0: 14-point	N0: 24-point	

For outline font character sets, the naming structure is much simpler. The structure is `CZfss` where:

CZ   Designates an outline font.

f   Designates the typeface, such as Helvetica

ss   Designates the typeface, such as Roman Bold

An example of the name of an outline font character set is CZH200, which is Helvetica Roman Medium.

Code Page Naming Convention

Like font character sets, code pages are named in a number of ways. One way is with a code page name. These code pages are downloaded to the printer. The code page name can be up to 8 characters long. Code page names are used with character set names for printing on printers with host-resident fonts, such as the Infoprint 2000, 2085, 2105, 4000, and 4100.

Another way is with a code page global identifier (CPGID). CPGIDs are printer-resident code pages and have numbers for names (for example, 259 or 500). Generally, printers with resident fonts use CPGIDs to name the printer-resident code pages. CPGIDs are also used within CHRIDs. In this case, the structure is `T1Vnmmmm:` where:

T1   Designates a code page.

V*n*   Designates the version of the code page, such as version 1.

mmmm
Designates the 4-character page name, number, or category. For example, 0500.

Coded Font Naming Conventions

Unlike other font components, coded font names are generally shortened by excluding the origin and reserved characters (the first two characters of their name). This is necessary because some AFP licensed programs accept only 6 characters for coded font names. However, some applications can use coded fonts named with 6 or 8 characters.

Coded font names on the iSeries server are 6 or 8 characters long. Each character or group of characters tells something about the coded font. The structure is X*cftpp*, where:

X*c*   X*c* means that this object is a coded font. XZ means that this object is an outline coded font. Otherwise, the first two characters are X0.

f   Indicates the type family.

t   Indicates the typeface.

pp   Indicates the characters per inch for uniformly spaced and mixed-pitch fonts.

For example, the coded font name X0GT10, is for a Gothic text style font and the characters are 10 characters per inch.

To find out which font character set and code page make up a coded font name, use the Work with Font Resources (WRKFNTRSC) command. This command allows you to specify the font resource to be worked with, the library it is in, and the attribute (coded font).

Additional naming conventions have been adopted to more explicitly name the code page used with a character set.

For more information about font names, refer to *IBM Infoprint Fonts: Font Summary* or the iSeries output Web page: `www.ibm.com/eserver/iseries/printing`.

How PSF Finds an AFP Font

Because there are different places a font can be stored, PSF needs a method to find and select a font to use. This is how PSF searches for a requested AFP font when it is referenced without a library qualifier:

- If the font requested is printer-resident (the application requests the font by FGID) PSF looks in the printer for the font. If it is not found, PSF might use a different printer-resident font. When PSF uses a different font than requested, it is called *font substitution*.
- If the font requested is host-resident (the application requests the font by character set and code page or coded font), PSF looks on the iSeries for it. If it is found, PSF downloads it if it has not already been downloaded to the printer. While outline fonts have a unique name (CZ*xxxx*), 240- and 300-pel raster fonts have the same name but are stored in different libraries. i5/OS will select the correct font. These are the libraries in which PSF looks for a requested font:
  1. Libraries in the user's library list, specified on the PSF configuration object. The libraries searched vary, depending on the value specified:

*JOBLIBL

The job library list in effect at the time the spooled file was created is searched. The job library list is the System Library list followed by the User Library list.

*CURLIB

The current library is searched. If no current library has been defined, QGPL is searched.

*NONE

Only the device resource library list is used.

2. Libraries in the device resource library list, specified on the PSF configuration object. The libraries searched vary, depending on the value specified:

*DFT The system font libraries, as listed below are searched:

   – QFNTCPL: This library is shipped with the operating system. It contains the 240-pel AFP Compatibility Fonts.
   – QFNT01-QFNT19
   – QFNT61-QFNT69

library-name

Up to 30 library names can be listed.

3. If a PSF configuration object has not been created for the selected device, step 1 is followed, with a value of *JOBLIBL, then step 2, with a value of *DFT.

For information about the library lists and how to specify them, see "How PSF Searches for Resources" on page 285.

• If the font is not found, a substitute font might be used. For a description of the cases when a substitute font is used, see "AFP Font Substitution" on page 58.

It is generally a better idea to use *LIBL when specifying a font library to search than specify one individually, because when you specify an individual library, you limit your fonts to a single resolution.

If you have certain fonts that you want to use for a specific device, for example, if you want to use 300 dpi fonts with one printer and 240 dpi fonts with another, specify the appropriate libraries in a device resource library list. The device resource library list is specified on the PSF configuration object associated with the device. Alternatively, because of the way the system looks for fonts, you can store fonts that are needed at print time in the QFNTxx libraries and they will be found. You could, for example, change library QFNT300CPL to QFNT01, as long as QFNT01 does not already exist on your system. To rename that library, use this command:

```
RNMOBJ OBJ(QFNT300CPL) OBJTYPE(*LIB) NEWOBJ(QFNT01)
```

Note: You must have object management authority to the library you are renaming.

For more information about i5/OS libraries, see "How PSF Searches for Resources" on page 285.

Captured Fonts

A printer that supports font capture can dynamically "capture", or cache, a host-downloaded font. The captured font then acts like a printer-resident font, even

when the printer has been powered off. Network traffic is reduced by eliminating subsequent font downloads to the printer.

Notes:

1. With AFP fonts, improper use of font capturing can cause unpredictable results. Therefore, only system administrators should handle the AFP font capture feature.

2. Even after a font is captured, the host font must still remain on the system because the printer might discard fonts to free up space, and the font might need to be reloaded. In addition, users must still have authority to the font object on the host in order to use it.

Refer to the iSeries Information Center for information about the proper use of font capturing. AFP fonts are marked as eligible for capture in a PSF configuration object. For instructions to enable font capture, see "Capturing Fonts" on page 95.

AFP Font Substitution

When you use AFP fonts, i5/OS tries to print your file even if it does not have the font you requested. It substitutes a font that will produce similar, if not exact, results. However, if you specify FIDELITY(*ABSOLUTE) on the printer file, the match for font substitution must be exact or the job will not print. To allow font substitution, specify FIDELITY(*CONTENT).

Note: There is no substitution done for TrueType fonts. If a requested TrueType font cannot be found, processing stops.

If the requested font is printer-resident, a substitute font is used in these situations:

- If the printer supports resident fonts but does not contain the requested font, a substitute printer-resident font is used. For information about how the substitute font is selected, see the information about the Printer-resident font to printer-resident font mapping table in "Font Mapping Tables" on page 60.

- If the printer does not support resident fonts, a host-resident font is downloaded and used. For example, if Letter Gothic (FGID 87) is requested, but not resident, a host font from the font substitution tables (such as the Letter Gothic bitmap character set C0S0LR12) is selected and downloaded to the printer.

If the requested font is a host font, a substitute font is used in these situations:

- If the printer does not support downloaded fonts, such as impact printers, and a matching printer-resident font exists, the matching printer-resident font is used.

- If the printer does not support downloaded fonts and an exactly matching printer-resident font does not exist, a printer-resident font that matches the requested font as closely as possible is substituted.

- If the printer supports downloaded fonts but the font cannot be found by searching the resource library list or is in the wrong resolution, the printer tries to substitute a printer-resident font. If there is not an exact match, the print job is held.

No substitution of coded fonts takes place on the iSeries server. If the coded font is not available, the document will not print. However, you can use these parameters on the PSF configuration object to specify font substitution in certain circumstances:

MAPIGCFNT(*YES)
　　　　Specifies that DBCS simulation fonts are used instead of the DBCS raster fonts specified in the data stream. DBCS simulation fonts are outline fonts

that are positioned like raster fonts. This lets you use outline fonts to print applications that use DBCS raster fonts without changing the application or the appearance of the printed output.

USEOUTLFNT(*YES)
Specifies that downloadable AFP raster fonts (named X0*nnnnnn*) are replaced with equivalent downloadable outline fonts (named XZ*nnnnnn*) if they exist. If the XZ*nnnnnn* coded font is found, it is used, if it is not found the X0*nnnnnn* coded font is used.

Example 1:

Assume these conditions:
- Your application calls for a font character set (FNTCHRSET specified on the printer file), for example, C0S0CR10 for Courier Roman medium 10 pitch.
- The printer is a 4224 and has resident fonts identified by FGIDs.

FGID 11 will be substituted for C0S0CR10 and sent to the printer. In this example, the system substitutes a font that is resident on that printer.

Example 2:

Assume these conditions:
- Your application calls for a font (specified on the FONT parameter of the printer file). The font specified is font 26 (Gothic Matrix, Roman medium 10 pitch) and you have been using a 3812 printer.
- You decide to print the document on your new Infoprint 2085 printer. Font 26 is not supported on the Infoprint 2085.

In this example, the system substitutes font 11 (Courier, Roman medium 10 pitch). You can figure out such substitutions by looking at the font substitution table in Table 7 and the iSeries Information Center.

Example 3:

Assume these conditions:
- Your application uses a font (specified on the FONT parameter of the printer file). The font specified is font 40 (Gothic, Roman medium 10 pitch).
- The printer you are going to print on supports only font character sets (for example, a 3827).

In this example, the system substitutes font character set C0D0GT10 (Gothic Text, Roman medium 10 pitch). You can figure out such substitutions by looking at the font substitution table in the iSeries Information Center.

Below is a partial list of printer-resident font substitutions for the Infoprint 2085. You can find complete font substitution lists in the iSeries Information Center.

Table 7. Font Substitution on Infoprint 2085 (partial list)

FGID Requested	FGID Used by Printer	FGID Requested	FGID Used by Printer
2	11	19	19
3	11	20	11
5	11	21	11
8	11	25	11

Table 7. Font Substitution on Infoprint 2085 (partial list) (continued)

FGID Requested	FGID Used by Printer	FGID Requested	FGID Used by Printer
10	11	26	11
11	11	30	11
12	12	31	11
13	11	36	11
18	18	38	46

You can suppress messages regarding *successful* font substitutions. Messages indicating that a font substitution attempt failed are always issued. To suppress messages regarding successful font substitution, specify FNTSUBMSG(*NO) on the PSF configuration object used by the device to which you are printing. Alternatively, you can change it using the AFP Manager component of iSeries Navigator by de-selecting **Notify after successful font substitution** on the PSF Configuration **Resources** page. For detailed instructions about using iSeries Navigator to work with PSF configuration objects, see "Changing a PSF Configuration Object" on page 233.

Font Mapping Tables

Font mapping tables control how the fonts are substituted, when necessary. PSF comes with system versions of all of the host-to-printer and printer-to-host font mapping tables. However, you can also create your own font mapping tables. If you do create font mapping tables, PSF searches your tables for a font substitution before the system tables. You can create these mapping tables:

*   Host-resident font character set to printer-resident font character set (HPFCS)

    This table is named QHPFCS and is in library QUSRSYS. This table is used when your application references host-resident fonts (font character sets and code pages) and the printer, such as the 4224, 4234, 4230, 64XX, does not support downloading of host-resident fonts. PSF maps the references from host-resident fonts to printer-resident fonts.

*   Host-resident code page to printer-resident code page (HPCP)

    This table is named QHPCP and is in library QUSRSYS. This table is like the HPFCS table, in that it is used when the application references host-resident code pages and the printer being used does not support host-resident code pages. PSF maps the host-resident code page to a printer-resident code page and downloads to the printer (if necessary).

*   Printer-resident font character set to Host-resident font character set (PHFCS)

    This table is named QPHFCS and is in library QUSRSYS. This table is used when your application references printer-resident fonts and the printer, such as the 3827, 3825, 3820, 3900 Model 1, does not support resident fonts. PSF maps the references from printer-resident fonts to host-resident fonts and downloads them (if necessary).

*   Printer-resident code page to Host-resident code page (PHCP)

    This table is named QPHCP and is created in library QUSRSYS. This table is like the PHFCS table, in that it is used when the application references printer-resident code pages and the printer being used does not support them. PSF maps the printer-resident code page to a host-resident code page and downloads it to the printer (if necessary).

*   Printer-resident font to printer-resident font

For the printer-resident to printer-resident font mapping table, the following processing is done by the system:

– If the printer-resident font specified in the print job is supported by the printer, then it is used. The printer-resident to printer-resident font mapping table is not searched.

– If the printer-resident font specified in the print job is not supported by the printer, then the printer-resident to printer-resident font substitution table is searched.

  - If a matching entry is found in the printer-resident font mapping table and the entry is supported by the printer, then the specified substitute font in the printer-resident font mapping table is used.

  - If a matching entry is not found in the printer-resident font substitution table or if the specified substitute font is not supported by the printer, then the system will use its internal font substitution tables to perform the font substitution.

Notes for the printer-resident font mapping table:

1. This font substitution table controls font mapping by printer type group, not by individual printer type.

2. You can only make a substitution for fonts (FGIDs) that are not supported by the printer group. For example, if the printer group has FGID 11, you cannot map it to something else.

The iSeries Information Center lists the system font mapping tables. You can also view the system font mapping tables with the i5/OS DSPFNTTBL (Display font table) command or AFP Manager.

"Working with Font Mapping Tables" on page 94 has commands to use with font mapping tables.

Where to Get AFP Fonts

You can get fonts from any of these places:

• Fonts can come with your printer.

• You can get them from a font product and install them on your iSeries server, see "i5/OS Font Products" on page 62.

• You can use a conversion product to convert a font to AFP format.

Fonts Resident on Your Printer

To determine what fonts are resident on your printer, refer to your printer's documentation or print the resident fonts from the printer control panel.

Example:

The IBM Infoprint 2085 lists its resident font character sets and code pages (double- and single-byte) by FGID, GCSGID, and typeface. This printer has Times New Roman, Helvetica, Courier, ITC Boutros, Boutros, Narkissim, Shalom, and other typefaces for various code pages. This is part of the font list:

Table 8. IBM Infoprint 2085 Fonts (Partial List)

FGID	GCSGID	Typefaces - Latin 1/2/3/4/5 with Euro
2308	1355	Times New Roman Medium
2309	1355	Times New Roman Bold

Table 8. IBM Infoprint 2085 Fonts (Partial List) (continued)

FGID	GCSGID	Typefaces - Latin 1/2/3/4/5 with Euro
2310	1355	Times New Roman Italic Medium
2311	1355	Times New Roman Italic Bold
2304	1355	Helvetica Roman Medium
2305	1355	Helvetica Roman Bold

i5/OS Font Products

The font products described in this section provide host-resident fonts.

IBM Infoprint Fonts for Multiplatforms (Program 5648-E77)
> IBM Infoprint Fonts for Multiplatforms licensed program is the current and recommended font product. It is best for customers who do not already have AFP Font Collection or who want to use the Font Installer for AFP Systems to install and manage TrueType fonts.

IBM Advanced Function Printing™ Fonts for AS/400® (Program 5769-FNT)
> This licensed program is only required for compatibility with older font technology.

IBM AFP Font Collection for Workstations and OS/400® (Program 5648-B45)
> This licensed program is only required for compatibility with older font technology.

You do not typically need to install every font library on your i5/OS. "Which Font Libraries Should I Install?" on page 53 gives suggestions about which font libraries to install.

IBM Advanced Function Printing DBCS Fonts for AS/400 (Program 5769-FN1)
> This licensed program is only required for compatibility with older font technology.

The following font groups are collected free of charge in the iSeries base operating system and can be optionally installed on any iSeries system.

AFP Compatibility Fonts
> AFP Compatibility Fonts is included free of charge in the iSeries base operating system. It can be installed as an option on any iSeries system. The fonts are downloadable 240-pel raster fonts and are installed in font library QFNTCPL.

GDDM Fonts
> *OS/400 - GDDM* is included free of charge in the iSeries base operating system and can be optionally installed on any iSeries system. If the option is installed, you can find a list of graphic symbol sets in the library QGDDM (look for object type *GSS). You can use these fonts in printer files, in DDS, and with the optional licensed program Business Graphic Utility (5763-BG1). They work on any IPDS printer that supports GOCA.

> GDDM (Graphical Data Display Manager) has two types of graphic fonts:

> **Vector symbol sets**
> > These are identified by an object attribute *VSS. Each character is built with a set of straight or curved lines.

> **Image symbol sets**
> > These are identified by an object attribute *ISS. Each character is a pattern of dots quite similar to FGID, except that some graphic characteristics apply.

Note: Image symbols are not supported in DDS.

Additional Fonts Option
These TrueType fonts are shipped with i5/OS (installed with option 43
Additional fonts).

AFP MICR Fonts, RPQ 8A8083
This font offering provides MICR fonts necessary for printing on IBM
MICR printers. These fonts are also incorporated with Infoprint Designer.

Images and Graphics

Images and graphics are key components in creating advanced electronic print and presentation applications. In some cases, such as with accent images, the purpose of the image or graphic is to improve the look and effectiveness of output. In basic documents, images, such as an enterprise logo, are an essential part of the document. In other image applications, such as an integrated check image on bank statements, the image itself is part of the application. Images and graphics are usually included in a document in a page segment resource.

Some common examples of putting images and graphics to work in i5/OS applications include:

- Document logos
- Electronic signatures
- Accent images, such as the variable image used in the Super Sun Seeds sample application (see Figure 53 on page 150)
- Document images, such as check images and freight bill images
- Pictorial graphics, such as pie and bar charts

Figure 23 on page 64 shows a Super Sun Seeds invoice case study with an example of an image (the Super Sun Seeds logo) and a graphic (the pie chart). In fact, there are more graphics on the invoice than just the pie chart. The line and box elements on the invoice form are also graphics.

Figure 23. Image and Graphic on the Sample Page

Images and Graphics in AFP Output

AFP output can contain both graphics and images. Images are captured while graphics are created. In many instances, these terms are used interchangeably, but for data processing applications, they are used very differently.

The term *image* is usually applied to a captured replica of an external source document. The source document can be a photograph, drawing, signature, or a printed or handwritten page. The source document is usually captured by a scanner. An image has to be in the appropriate format to be used with AFP output. There are several tools you can use to generate AFP images from other data types, such as the image (gif, tiff, and jpeg) to AFP transforms in Infoprint Server, and the Image Editor component of Infoprint Designer.

The term *graphic* is normally applied to pictorial data that is created internally. i5/OS applications that create graphical data include:
- Business Graphic Utility
- GDDM/400
- AFP Utilities

Graphics applications let you create shapes with lines or generate charts based on numerical input. The resulting graphic can be as simple as a box on an electronic form, or as complex as an engineering drawing.

Images and graphics are also distinguished by how the object is stored. Images are stored in digital format. Regardless of image file format, the image is represented by a string of bits that correspond to the exact layout of the dots on the page required to reproduce the image.

If the image is stored as a complete string of bits, it is called a raster, or bitmapped, image. There are data-reduction techniques that can compress the image, reducing amount of storage required to record the image.

An image is closely tied to the resolution at which it was created. An image that is scanned at one resolution and printed at another will change in size, and possibly proportion, unless some compensating manipulation is done.

Graphics are stored in vector representation and are similar to mathematical equations. A graphic is made up of commands to draw lines, arcs, and circles. The size of the final output can be varied by modifying the vector equations. Thus, graphics can easily be scaled or sized. They also take up relatively little storage space. In AFP, graphic elements are in the lines and boxes that comprise electronic forms, in the drawing orders for scalable or outline fonts, and in the bar and pie charts created with Business Graphic Utility and GDDM/400.

Image and Graphic Terminology

These are common terms used in working with images and graphics:

Table 9. Image and Graphic Terminology

Term	Definition
Bilevel	Image composed of only black and white pels. A bilevel pel is represented by a single bit. Most monochrome printers are bilevel image printers.
Clip	To truncate image information that lies outside a given boundary.
Compression	Method of making image data files smaller so that less disk space is used to store them and less system and printer resources are used to send and print them.
Crop	In image applications, to cut off or trim.
File Format	How image data is physically stored in a file. For example, how the image header is structured, and how the actual image data is stored. Each image file format has a unique structure that enables programs that work with images to identify which format is being used.
Page Segment	General term for an AFP image object. A page segment object is an IOCA image file with iSeries object wrappers.
Pel	Abbreviation for picture element. It is the smallest addressable element of an image. The term dots per inch (DPI) is also used.
Pixel	Early nickname for picture element. Pel is the more common term.
Raster	In computer graphics, a predetermined pattern of lines that provides uniform coverage of a display space. In other words, the entire image is represented by data bits. Contrast to vector where the image is represented by mathematical formulas.
Resolution	Number of pels per unit length on the image device, whether that device is a scanner, display, or printer. Common image resolutions are 144 pel (also called dots per inch, or dpi) for impact printers, and 240 pel, 300 pel, and 600 pel for printers and scanners.
Scale	In computer graphics, to enlarge or reduce all or part of a display image.
Scanner	Device to convert a physical image into digital form.

Table 9. Image and Graphic Terminology (continued)

Term	Definition
Wrappers	Header and trailer information "wrapped" around an image object enabling it to conform to a particular document architecture.

Image File Formats

These are the most widely used file formats for storing image data:

Table 10. Commonly Used Image File Formats

File type	Description
BMP	Bitmap, a simple format generally used for display, clip art, and so on. BMP is seldom compressed. Signature is X'4D42' in the first two bytes.
CGM	Computer Graphics Metafile. Industry standard specification for graphics creation.
EPS	Encapsulated PostScript. Subset of the PostScript page description language from Adobe. EPS supports both raster and graphic formats.
GIF	Graphical image format. A digital format that is used to compress and transfer graphical information over computer networks. For example, GIF is a common format for displaying graphical information on the Internet.
IM1	IPDS format for uncompressed raster image.
IMDS	Image Data Stream. Architected image format, more widely known as IOCA.
IOCA	Image Object Content Architecture. Can be compressed or uncompressed. Also known as IO1. IOCA defines five function sets: FS10, FS11, FS20, FS42, and FS45. **FS10** is intended for bilevel images. **FS11** and **FS20** cover bilevel, grayscale, and color images. **FS42** covers tiled bilevel images and tiled CMYK images with 1 bit per spot. **FS45** carries tiled bilevel and CMYK images. CMYK images can be either 1 or 8 bits per spot. FS11 is a superset of FS10. FS45 is a superset of FS42. There are no other relationships among the functions sets.
PCX	Simple format, generally used for display, clip art, and freehand graphics. It has X'0A' in the first byte.
TIFF	Tagged Image File Format. Most common file format in document imaging and scanning. It has "II" or "MM" in the first two bytes and is compatible with a number of personal computing platforms.
JPEG	Joint Photographic Experts Group. A standard format for storing compressed true-color images commonly used for displaying documents on the Internet.

Images are generally stored on the i5/OS in two formats, IOCA and IM1. Images for AFP printing applications are stored as page segment resources. Images for ImagePlus and Workfolder Application Facility are IOCA and are stored in folders.

All IBM printers support IM1, and nearly all IPDS printers support IOCA image, which has become the standard. IOCA images:

- Can be compressed
- Can be placed in any position on the page
- Are resolution independent
- Can be scaled by the printer to any size
- Can be rotated by the printer
- Can be clipped by the printer so that only a portion of the image is printed

Image Compression

Storing an 8-1/2 by 11 inch page at 300 pel density requires over 1 million bytes for simple bilevel images. Grayscale and color images take up significantly more storage space. Uncompressed images have to be laboriously moved around the system to be displayed or printed.

Image compression can significantly reduce the storage size of an image along with improving the efficiency with which images are sent to the device. IPDS printers are designed to efficiently decompress compressed images.

IPDS printers support several different image compression techniques. These are some of the most common:

- ITU-TSS Group 3, the industry standard for facsimile (FAX) machines
- ITU-TSS Group 4, the industry standard for scanners
- MMR, used by IBM scanners
- ABIC, a compression technique used to handle checks and financial documents
- Solid rectangle fill, which is used by Infoprint Color xxx printers.

Compression techniques work most effectively with high contrast images, images that have a lot of black and white space. They are less effective with photographs. Referring again to an example of an 8-1/2 by 11 inch scanned image, this image could easily be compressed to 1/10 its size (100,000 bytes, or less) if it was a high contrast image.

Overlays

An overlay, or electronic form, is a collection of constant data stored as an AFP resource and primarily used in place of preprinted forms. It can include some or all of these elements:

- Vertical, horizontal, and diagonal rules
- Rules with different weights and thickness
- Boxes with and without shading
- Grids, arcs, and polygons
- Graphics or images, such as company logos
- Bar codes
- Text
  - In different inline directions and character rotations
  - In different fonts, including fonts not used in the input file

Figure 24. Overlay on the Sample Page

Why Use an Overlay?

Overlays facilitate completely electronic presentation. They replace preprinted forms – a manual printing process. Overlays provide significant benefits over preprinted forms including:
- No forms inventory
- No obsolete forms
- Faster turnaround for new forms
- Less operator intervention

However, the benefits of overlays go far beyond production cost savings. With electronic documents, you can:
- Re-engineer business processes, such as changing workflow with bar codes
- Respond to vendor or supplier requirements
- Create effective, competitive documents

Options for Building Overlays

There are many alternatives available for creating overlays to be used in AFP printing applications. The options differ both in cost and in function. It is important to evaluate your requirements to select what best suits your needs. You should consider how many forms you need, as well as how complex they are.

Some of the options available include:

- Infoprint Designer. For information about using Infoprint Designer, see Chapter 16, "Using Infoprint Designer," on page 165.
- IBM AFP Printer Driver for Windows. For information about using the AFP Printer Driver for Windows, see "Creating an Image Resource with the IBM AFP Printer Driver for Windows" on page 103.
- DDS (overlay equivalent using text, line, box, and pagseg keywords). For information about using DDS, see Chapter 15, "Using Data Description Specifications," on page 137.
- Infoprint Server's Windows-based image transforms. Infoprint Server can transform a GIF, TIFF, or JPEG file on your PC to an AFP overlay. See "Creating an Image Resource with the Infoprint Server Image Transforms" on page 103 for instructions.
- Forms transferred from other systems
- Services from IBM and other companies

Bar Codes

Bar codes represent characters, typically with sets of parallel bars of varying width and separation or varying heights. Combinations of bars and spaces form individual characters, which in turn represent a numeric or alphanumeric symbol that might be a product, part, or publication number. These are called *linear* bar codes. Bar codes can also be two-dimensional (2D). 2D bar codes allow large amounts of information to be encoded in a two-dimensional matrix. They are usually rectangular and use extensive data impaction and error correction codes.

Bar codes are designed to be read by a device called a bar code reader or scanner. The scanner must be compatible with the printed bar code symbology.

Bar codes can be produced using either AFP data stream presentation text data or an AFP data stream bar code data object. A bar code data object, which is a set of structured fields, specifies the type of bar code (the symbology), its size, and positioning information. Many different bar code symbologies can be produced using bar code objects.

Figure 25 on page 70 shows bar codes printed on the sample page. The zip code at the top of the sample page is printed in POSTNET bar code. The customer number and invoice amount are printed in Interleaved 2 of 5 bar code at the bottom of the page.

Figure 25. Bar Codes on the Sample Page

Bar Code Terminology

Table 11 explains some of the basic language used in bar code applications.

Table 11. Bar Code Terminology

Term	Definition
Aspect Ratio	The ratio of the length (or height) of a bar to the length (or width) of the linear bar code symbol.
Bearer Bars	A bar across the top and bottom edge of a linear bar code. Partial scans of bar code symbologies, such as Interleaved 2 of 5, can produce valid, but incorrect, reads by self-discriminating scanners. Bearer bars help prevent such errors and increase reliability. **Note:** A self-discriminating scanner is one that automatically determines which bar code symbology it is reading.
Check Character	The result of some mathematical combination of the characters in the field being bar coded. Used as a check of the accuracy of both the input of the data field and the scanning of the bar code. A bar code can have 0, 1, 2 or sometimes more check characters.
Check Digit	Same as a check character, but limited to decimal digits only.
Continuous Code	A linear bar code in which each character starts immediately after the preceding character. There is no space or gap between characters. Interleaved 2 of 5 is an example of a continuous bar code.

Table 11. Bar Code Terminology (continued)

Term	Definition
Density	A measure of the number of characters per inch or per millimeter represented by the bar code. A high-density bar code represents more characters per inch than a low-density bar code. The bar code symbology helps determine the density. Within a given symbology, factors that affect the density of a bar code are: the x-dimension (width of the narrow bar) and the wide-to-narrow ratio (width of a wide bar relative to the narrow bar).
Discrete Code	A linear bar code constructed with groups of bars and spaces representing individual characters and having a space or intercharacter gap between each group. This gap is used solely to separate characters and contains no data. Code 3 of 9 is a discrete bar code.
First Read Rate	The percentage of the bar code scans that read correctly on the first scan of the bar code. A 99% or higher first read is desirable. Anything below 85% is normally not acceptable.
Human Readable Interpretation (HRI)	The translated characters of a linear bar code that can be read by a human.
Intercharacter Gap	The space between characters in a discrete bar code symbology.
Ladder Orientation	Linear bar code orientation where the bars are parallel to the base of the document (like the rungs of a ladder). It is sometimes called vertical orientation because that is the direction of the scan.
Picket Fence Orientation	Linear bar code orientation where the bars are perpendicular to the base of the document (like the pickets in a picket fence). Sometimes called horizontal orientation (because that is the direction of the scan).
Quiet Zone	A blank area prior to and following a bar code. This required space enables the scanner to differentiate the start and stop of a bar code. The size of the quiet zone is usually 10 times the x-dimension or 1/4 inch, whichever is larger.
Stop Pattern	A special bar code character that provides the scanner with stop reading instructions. The stop character is normally at the right end of a horizontally oriented symbol.
Symbology	The name of the specification used to define the combinations of bars and spaces for encoding data.
Wide-to-Narrow Ratio	The ratio of the width of the wide bar or space to the narrow bar (x-dimension) or space in a two-width symbology. This ratio is usually in the range of 2:1 to 3:1.
X-Dimension	The width (usually in thousandths of an inch) of the narrow bar or space of the bar code symbology.

Bar Code Basics

All linear bar codes, regardless of the symbology used, are created using the same, basic elements. Figure 26 on page 72 shows the common elements of all bar codes.

Bar Code Basics

Leading Quiet Zone
Narrow Bar
Wide Bar

Trailing Quiet Zone
Narrow Space
Wide Space

Character Gaps

* A 1 *

Start / Stop   Alpha / Numeric   Start / Stop
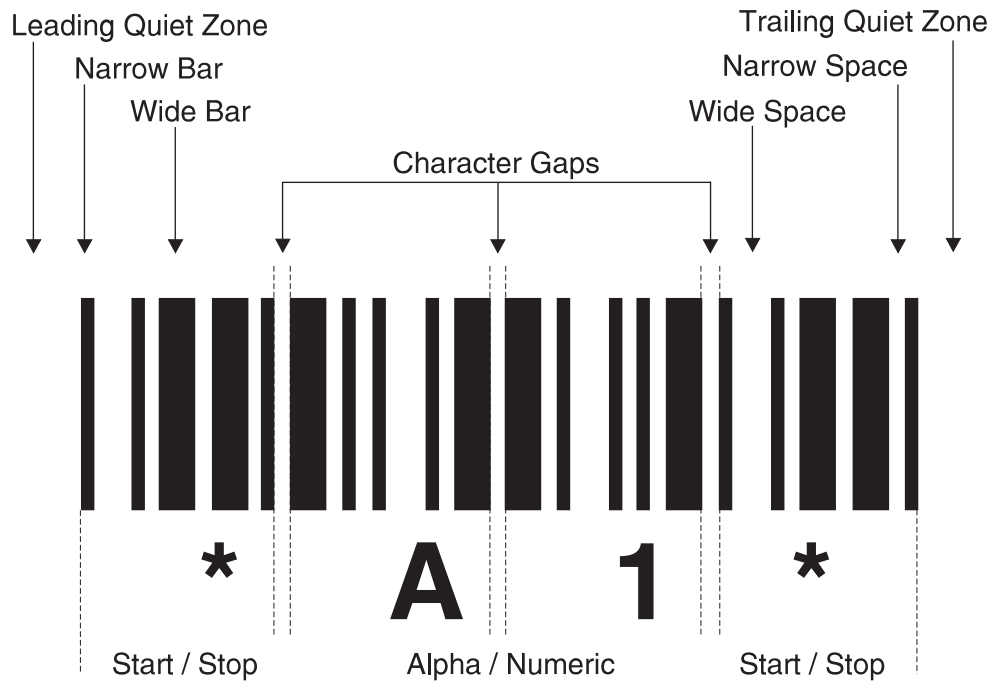
Figure 26. Linear Bar Code Elements

Bar Code Symbologies

Many different types of bar code symbologies, or coding arrangements, have been developed. Among the more widely used bar code symbologies are:
- Code 3 of 9
- Codabar
- Interleaved 2 of 5
- Code 128
- Universal Product Code (UPC)
- European Article Numbering (EAN)
- Postnet (Postal Bar Code)
- Royal Mail (Postal Bar Code)
- Japan Postal (Postal Bar Code)
- Australian Postal (Postal Bar Code)
- PDF417 (2D)
- Maxicode (2D)
- Data Matrix (2D)

Bar Codes Supported by PSF

PSF accepts these types of bar codes:
- Australian Postal Bar Code
- Codabar, 2-of-7, AIM USS-128
- Code 39 (3 of 9 code), AIM USS-39
- Data Matrix
- EAN-8 (includes JAN-short)
- EAN-13 (includes JAN-standard)

- EAN Two-digit Supplemental
- EAN Five-digit Supplemental
- Industrial 2-of-5
- Interleaved 2-of-5, AIM USS-I 2/5
- Japan Postal Bar Code
- Matrix 2-of-5
- MaxiCode
- MSI (modified plessey code)
- PDF-417
- POSTNET
- Royal Mail Postal Bar Code (RM4SCC)
- UPC - Two-digit Supplemental (Periodicals)
- UPC - Five-digit Supplemental (Paperbacks)
- UPC/CGPC - Version A
- UPC/CGPC - Version E

Examples

This section contains examples of these bar codes:

- "Universal Product Code Example"
- "Postnet (Postal Bar Code) Bar Code Example"
- "Portable Data File 417 (PDF417) Bar Code Example" on page 74

Universal Product Code Example: Universal Product Code (UPC) is a continuous bar code symbology that also uses the module approach to construct digits. UPC uses two bars and two spaces and there is no wide-to-narrow ratio.

This type of bar code is divided into two halves, a left side and a right side. Digits on the left side are coded in odd parity (bar widths total up to an odd number of modules) while digits on the right side are coded in even parity. This enables either side of the symbol to be decoded separately and provides the advantage of being able to scan the bar code from almost any angle.

Figure 27 shows an example of the UPC bar code symbology.

Figure 27. UPC Bar Code Example

Postnet (Postal Bar Code) Bar Code Example: The Postnet bar code uses five bars to represent a digit. The data is based on the height of the bars instead of on their width. This symbology requires a check or correction digit. Postnet is a numeric bar code only with each digit having two tall and three short bars.

Figure 28 on page 74 shows an example of the Postnet bar code symbology.

```
POSTNET ZIP
```


Figure 28. Postnet Bar Code Example

Portable Data File 417 (PDF417) Bar Code Example: PDF417 is a two-dimensional (2D) stacked bar code symbology. The bar code can be full or truncated, as shown in Figure 29. The truncated PDF417 bar code symbol is for use in a relatively clean environment in which damage to the symbol is unlikely. This version omits the right row indicator and simplifies the stop pattern into a single module width bar.

PDF417   Truncated PDF417

Figure 29. PDF417 Bar Code Example
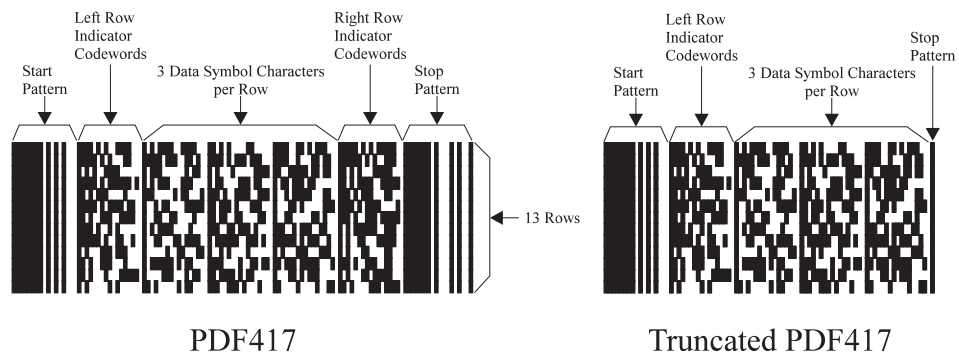
Page Definitions and Form Definitions

AFP supports two external resources for formatting pages – page definitions and form definitions. These resources contain rules for mapping application output into fully composed pages. Page definitions and form definitions are external to the application program and thus separate the final document formatting from the application.

Figure 30 on page 75 shows how page definitions and form definitions change the print flow. In the figure, a print application sends lines of output to the output queue. By specifying the page definition and form definition objects in the printer file, the line data output produced in the output queue is transformed by PSF to AFP.

Traditional Print Methodology
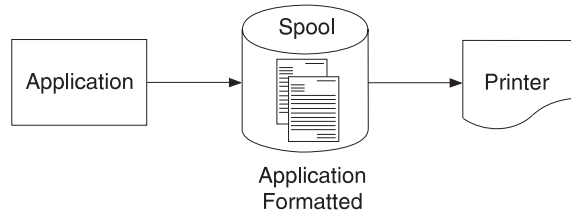
**AFP Page Definition/Form Definition
External to Application**
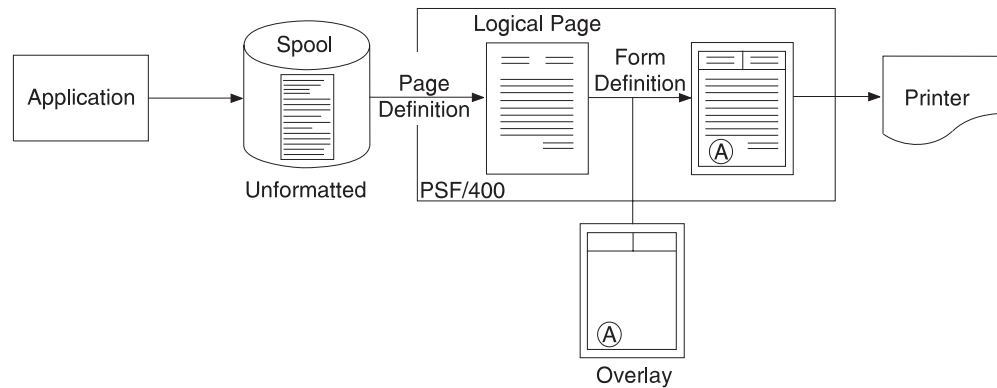
Figure 30. Traditional Printing Compared to Printing with Page Definitions and Form Definitions

Page Definitions

A page definition defines how line data (traditional and record format) and XML data is placed on a logical page by PSF (page definitions are not used for AFP data because it is already composed into pages). Input print lines are read in, optionally parsed into individual fields, and placed on the page. Similar in structure to DDS, the page definition language lets you place print lines or print fields anywhere on the page while controlling fonts, orientation, color, and more. A page definition performs many of the same functions that DDS does, but page definitions are independent of the application program. Figure 31 on page 76 shows how the page definition works.
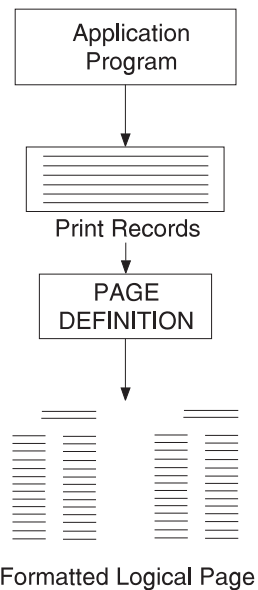
Figure 31. How a Page Definition is Used

Specifying a page definition is optional. If you do not specify a page definition, media handling characteristics are taken from existing keywords. If you do specify a page definition, its media handling instructions override those specified in existing keywords. The form definition is normally used with the page definition. It can, however, be used by itself.

Page definitions can contain conditional logic. This means that the formatting rules can change based on the contents of an input field. A "trigger" field (for example, company number) can be used to select a whole series of formatting commands.

These are some of the options you can specify with page definitions:
- Dimensions of the logical page
- Print direction of the logical page (landscape or portrait)
- Print direction of lines and fields relative to the logical page
- Conditional processing (enabling the content of the print data to control the layout and media handling of the print job)
- Line spacing (number of lines per inch)
- Location of individual lines and fields
- Number of lines per page
- Page segments for inclusion in printed output
- Overlays for inclusion in printed output (positioned anywhere on the page)
- Page-ejection points
- Fonts and font rotation used on a page
- Multiple-up printing (placing more than one logical page on one side of a single sheet)
- Colors to be used (on printers that support this function or for viewing)
- Print position for carriage controls or channel codes
- Constant data to be printed
- Bar codes to be printed
- XML formatting
- Record format line data formatting

LPI, # Lines   Print Direction   Multi - Up Printing
Channel Codes

Line Position   Record Formatting   Font Selection
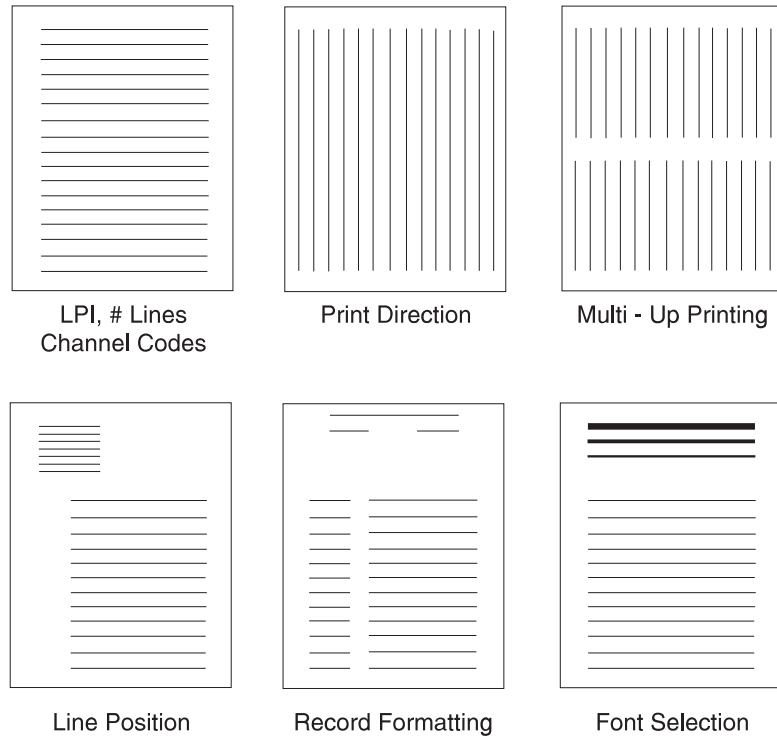
Figure 32. Page Definition Functions

See Chapter 16, "Using Infoprint Designer," on page 165 for information about creating page definitions.

Form Definitions

The form definition controls how the logical page (defined with the page definition) is placed on the physical medium - the sheet of paper. Figure 33 on page 78 illustrates how a form definition is used.
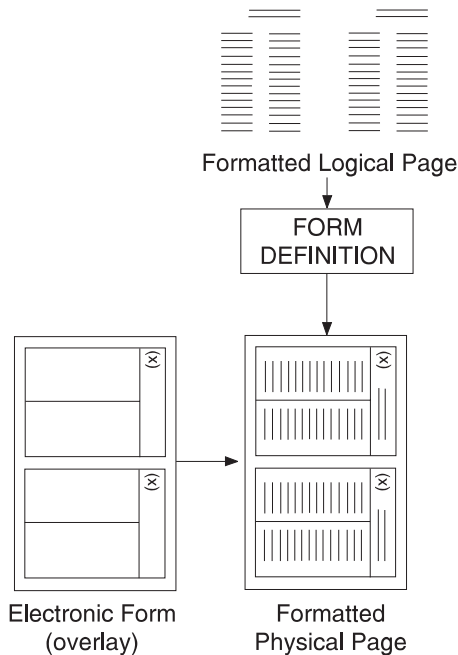
Figure 33. How a Form Definition is Used

A form definition performs many of the same functions as a printer file on the i5/OS, but a form definition is optional. If you do not specify a form definition, media handling characteristics are taken from other existing keywords. If you do specify a form definition, its media handling instructions override those specified in existing keywords.

These are some of the options you can specify with form definitions, within the limits of your printer:
- Position of a logical page on a physical page (page origin).
- Duplex or simplex printing.
- Overlays to use.
- Number of copies of any page.
- Suppression of selected fields on a copy.
- Jog (the offset stacking of cut-sheet output or copy marking on continuous-forms output).
- Paper source for a cut-sheet printer (input bin).
- Print quality.
- Constant back (enables printing of a page without variable data).
- N_UP printing – printing up to eight logical pages on either side of a sheet. For example, you could have two logical pages on one side of a sheet and six logical pages on the other side of the same sheet.
- Page orientation (portrait or landscape).
- Postprocessing controls, such as:
  - selecting functions
  - perforating
  - cutting
  - stapling
  - folding
  - hole punching
  - nested finishing

Page Offset   Electronic Overlays   Page Replication
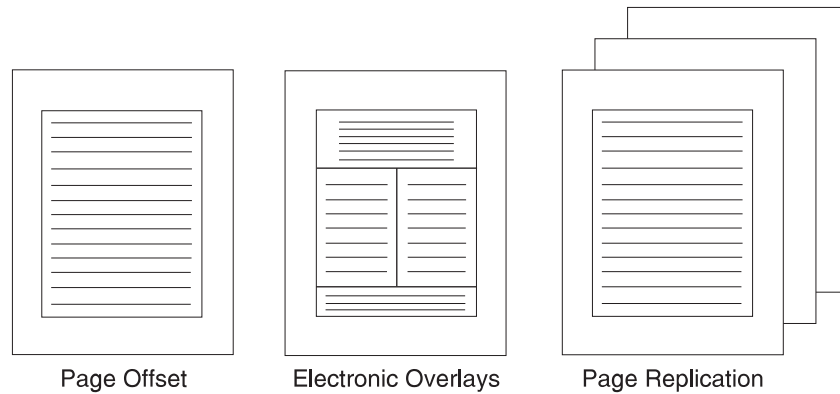
Figure 34. Form Definition Functions

See Chapter 16, "Using Infoprint Designer," on page 165 for information about creating form definitions.

How Page Definitions and Form Definitions are Used

Page definitions and form definitions, while frequently used together, can also be used independently. They even support different types of data. You can use a form definition with *SCS, *IPDS, *AFPDS, *AFPDSLINE, and *LINE data, but you can only use a page definition with *USERASCII for XML data, *LINE data, and *AFPDSLINE data. When specified, page definitions and form definitions are used throughout the print process:

1. Preparation stage
   a. The application generates line data.
   b. The person responsible for designing the output layout creates a page definition and form definition to format the line data. This step might require detailed knowledge of the application-generated line data.
2. Production stage
   a. The application generates line data specifying the corresponding page definition and form definition resources through printer file parameters.
   b. The line data is sent to a printer defined as AFP(*YES), where PSF uses the page definition and form definition to create a formatted data stream which is sent to the printer.

You can use page definitions and form definitions to specify options that are also specified on the printer file. Because of this, you should be aware of how the printer file interacts with page definitions and form definitions.

Printer File Keyword Support when Using Page Definitions and Form Definitions

With line data, the i5/OS can receive layout and media handling instructions through existing printer file command keywords and from page definitions and form definitions. Some printer file keywords are ignored when page definitions and form definitions are used.

Printer file keywords that are ignored when a page definition is used:

These printer file keywords are ignored when a page definition is used. If you specify line data to PSF and do not specify a page definition, a page definition is built by using the values for these parameters. However, this page definition is not part of the spooled file and cannot be transferred to another system.

CDEFNT	FONT	MULTIUP
CHRID	FNTCHRSET	PAGESIZE
CPI	LPI	PAGRTT
FOLD	LVLCHK	REDUCE

Printer file keywords that are ignored when a form definition is used:

These printer file keywords are ignored when a form definition is used. If you specify line data and do not specify a form definition, a form definition is built inline by using the values for these parameters.

BACKMGN	FOLD	MULTIUP
DRAWER (if *FORMDF is specified)	FORMFEED	PAGRTT
DUPLEX (if *FORMDF is specified)	FRONTMGN	PRTQLTY
FOLD	LVLCHK	REDUCE

Printer file keywords that override form definition values:

These printer file keywords, if used, override the values specified in a form definition:

DRAWER (if *FORMDF is not specified)

DUPLEX (if *FORMDF is not specified)

Sources of Page Definitions and Form Definitions

You can use many different methods to obtain page definitions and form definitions. Each option varies in level of skill required and cost. Use the approach that is best for you:
- Infoprint Designer is the standard graphical product for creating page definitions and form definitions interactively on top of an overlay design application. This lets you design the overlay and then format the existing print lines on top of that form. See Chapter 16, "Using Infoprint Designer," on page 165 for more information.
- PSF is shipped with a standard set of pre-compiled page definitions and form definitions to get you started immediately. The names and characteristics of these resources are included in the accompanying documentation.
- You can create page definitions and form definitions on other AFP platforms, such as MVS™, VM, VSE, z/OS and AIX.
- IBM Printing Systems Solutions Service Center.
- Other third party tools can generate these resources.

Object Containers

Object containers are used to carry non-OCA objects, such as GIF and TIFF images, in an AFP data stream. These non-OCA objects can be *wrapped* or *unwrapped*. Wrapped objects are carried in a MO:DCA envelope called an object container. Unwrapped objects are unaltered from their native form. If the object is to be carried in MO:DCA resource groups and interchanged, it must be wrapped.

Note: PSF does not check an object container's contents. Therefore, it is up to the user to verify that the printer can handle the type of data in the object container.

Object containers, even though they contain non-OCA data, are similar to other AFP resources in that they:

- Can be mapped. A mapped resource is downloaded once per spooled file, irrespective of the number of times the resource is referenced within the spooled file.
- Can be included on a page.
- Can be captured in the printer.

Using object containers has several benefits:

- You can reference several types of OCA objects (image data, bar code data and graphics data) in a spooled file without having to include them in an overlay or page segment.
- You can also scale and rotate these objects. If they were in a page segment or overlay and needed to be rotated, you would have to create one copy of the object in each orientation.
- You can include images larger than 16 MB in your output. If the image exceeds 16 MB, the image cannot be stored as a *PAGSEG object.
- Sophisticated print applications can specify the use of non-OCA objects which refer to other non-OCA objects, such as color mapping tables (which are printer-resident). These are called *secondary resources*.
- Applications can use color objects with IPDS printers.
- Infoprint Server's PDF subsystem accepts object containers with certain types of images as input. Refer to *Infoprint Server for iSeries: User's Guide* for more information.

See Chapter 12, "Working with Object Containers," on page 121 for information about specifying object containers in your data.

Chapter 7. Understanding and Working with TrueType and OpenType Fonts

Due primarily to the extensive operating system support and its popularity for PC applications, TrueType is probably the most prevalent font technology in the industry today.

Terminology Note: In this document, the term *TrueType* applies to both TrueType and OpenType fonts, unless otherwise specified.

This chapter introduces TrueType fonts on the iSeries and describes how to use them. It contains these sections:

- "Understanding TrueType Fonts" describes what a TrueType font is.
  - "TrueType Font Terminology" on page 84 lists terminology for advanced users.
  - "Where TrueType Fonts are Stored" on page 84 describes where TrueType fonts are stored on your system.
  - "How PSF Finds a TrueType Font" on page 84 describes how PSF chooses a TrueType font when you request it in your print job.
- "Working with TrueType Fonts" on page 85 describes how to use TrueType fonts on your i5/OS system.
  - "Installing a TrueType Font on the iSeries" on page 85 lists different methods for installing TrueType fonts on your server.
  - "Specifying TrueType Fonts" on page 86 describes how to specify TrueType fonts in your data.
  - "Specifying Unicode Complex Text" on page 87 explains how to specify a complex Unicode layout in your document.
  - "Capturing TrueType Fonts" on page 88 explains how font capturing is enabled for TrueType fonts.
  - "Installing and Specifying TrueType Fonts: Summary" on page 88 summarizes how TrueType fonts are used on the iSeries. It describes how to install and use the fonts.
- "Where to Get TrueType Fonts" on page 88 lists the IBM sources for TrueType fonts.
- "Differences Between AFP Fonts and TrueType Fonts" on page 89 compares and contrasts TrueType and AFP fonts.

The iSeries and PSF also support AFP fonts. For information about these types of fonts, see "AFP Fonts" on page 45. For more in-depth information about TrueType fonts, refer to *Using OpenType Fonts in an AFP System.*

Understanding TrueType Fonts

TrueType and OpenType fonts are popular for their wide variety of typefaces and ease of use. Typically, the term TrueType refers to both TrueType and OpenType fonts although the formats vary slightly. All TrueType fonts are outline fonts. This means that the fonts are resolution and size independent and thus can be scaled to any resolution and point size. They can also be specified in any of four orientations: 0, 90, 180, and 270 degrees.

Following are some terms that more fully describe TrueType and OpenType fonts. Only advanced users need to understand these terms.

TrueType Font Terminology

These terms will give you a more in-depth understanding of TrueType and OpenType fonts. However, you do not need to understand TrueType fonts on a deep level to use them:

OpenType format
The OpenType font format is an extension of the TrueType font format that allows better support for international character sets and provides broader multi-platform support. The OpenType format allows both TrueType or Adobe Type 1 outline fonts to be packaged as a TrueType font. OpenType fully supports Unicode.

Unicode
Unicode is the universal standard that defines a single encoding scheme to represent all of the characters used in all of the world's languages. This is one of the major encodings supported in TrueType fonts, and it forms the basis for the TrueType support in AFP systems. The AFP datastream accepts Unicode UTF-8 or UTF-16. i5/OS supports Unicode-enabled TrueType fonts.

Unicode-enabled
A Unicode-enabled font has these characteristics:
- It must contain a Microsoft Unicode subtable identified by platform ID = 3 (Microsoft) and platform-specific encoding ID = 1 (Unicode, UTF-16).
- It must specify a full font name (Name ID 4) using the same encoding in the naming table.

All fonts installed by IBM Font Installer for AFP Systems feature of Infoprint Fonts are Unicode-enabled.

Resource Access Table
When you install a TrueType font with the Font Installer for AFP Systems feature of Infoprint Fonts for Multiplatforms, it creates a resource access table (RAT). This table has a hard-coded name. It is used to find fonts on your system and to link fonts.

Font Linking
The ability for a TrueType font to be linked to another TrueType font. This forms an ordered list of fonts that are essentially processed as a single font.

Where TrueType Fonts are Stored

TrueType fonts reside in one of two integrated file system directories on the iSeries:
- /QIBM/ProdData/OS400/Fonts/TTFonts - contains IBM Fonts shipped with i5/OS (BOSS option 43 Additional Fonts).
- /QIBM/UserData/OS400/Fonts/TTFonts - contains user fonts.

How PSF Finds a TrueType Font

A TrueType font that is referenced in an AFP data stream might be located in an inline resource group or in one of the two TrueType font paths listed below. It might be packaged as a standalone font or in a font collection. It might also have linked fonts. To support this hierarchy, PSF searches for a referenced TrueType font as follows:

1. Printer-resident storage

2. Print file level resource group (inline)
3. File system directories and folders in the following order:
   a. Search the RAT, if it exists, in /QIBM/UserData/OS400/Fonts/TTFonts for a matching full font name.
   b. Search the RAT, if it exists, in /QIBM/ProdData/OS400/Fonts/TTFonts for a matching full font name.
   c. Search all the TrueType font files in /QIBM/UserData/OS400/Fonts/TTFonts for a matching full font name.
   d. Search all the TrueType fonts files in /QIBM/ProdData/OS400/Fonts/TTFonts for a matching full font name.

The font container or font collection container might also specify one or more linked fonts for the referenced font. The order in which they are specified on the base font container determines the order in which they are processed. The base font is always processed first, followed by the first-specified linked font, then the next-specified linked font, and so on. Only one level of linking is supported, that is, if a linked font is found and also specifies its own linked fonts, they are ignored.

Working with TrueType Fonts

This section contains instructions to use TrueType fonts.

"Installing a TrueType Font on the iSeries" describes two methods for installing TrueType fonts on your iSeries.

"Specifying TrueType Fonts" on page 86 explains how to specify a TrueType font in your document.

"Specifying Unicode Complex Text" on page 87 explains how to specify a complex Unicode layout in your document.

Installing a TrueType Font on the iSeries

There are two ways you can install a user TrueType font on the iSeries. A user TrueType font is one that is not shipped with the iSeries.

- **Preferred Method**: Use the IBM Font Installer for AFP systems. This is a feature of Infoprint Fonts for Multiplatforms. These are the benefits of using this method:
  - Fonts installed with this method are verified to be Unicode-enabled.
  - Fonts installed with this method can be identified as being capturable by the printer. For large fonts containing many glyphs, this will be especially useful. It will reduce download time significantly.

    Note: Capturing of TrueType fonts is not related to the Capture setting for non-TrueType fonts.
  - Fonts installed with this method can be linked. Linking allows multiple fonts to be logically linked together to form a single font. This is especially useful in markets such as Japan and China where large numbers of characters are required.
  - The Font Installer for AFP Systems can install TrueType Collections (TTC). A TTC is a file that consists of multiple TrueType fonts. Significant file size reductions can be achieved if fonts that share large numbers of glyphs are packaged in a TTC.

– You can view the font names within the font.
- **Less Desirable Method**: Place the font in /QIBM/UserData/OS400/Fonts/TTFonts. These are the disadvantages of using this method:
  – Fonts installed with method are not verified to be Unicode-enabled. If fonts that are not Unicode-enabled are placed this path are used by the print job, they will be sent to the printer and will fail at print time with a nack from the printer.
  – Fonts installed using this method cannot be captured.
  – Fonts installed using this method cannot be linked.

Specifying TrueType Fonts

You can specify a TrueType font anywhere that you can specify an AFP font. You can also mix references to TrueType and AFP fonts. However, TrueType fonts are referenced differently than AFP fonts. For an example of specifying TrueType fonts, see "Example" on page 92.

It is important to realize that while your printer driver, such as PSF, might support TrueType fonts, you can only print them if your printer supports the fonts as well.

To specify a TrueType font in your document, use the DDS FONTNAME keyword to specify the TrueType font name. You can also use this keyword to specify other options, such as a code page. The FONTNAME keyword accepts a string such as 'Time New Roman WT'. For more information about DDS keywords, refer to the iSeries Information Center. From the Information center, go to Programming ▶ DDS ▶ DDS keyword finder.

Important Notes:

1. You can use a code page with TrueType and OpenType fonts, but it is not required. If you do not specify a code page to use with the TrueType font, the system assumes the print data that is going to use this font is UTF–16. A code page is a map that equates a code point (the key pressed) to a single character in the character set. For more information about code pages, see "AFP Font Architecture" on page 50.

2. The font name must match exactly, including the case, trailing blanks, embedded blanks, and so on.

3. You must ensure that your printer supports the specified font. If the printer does not support a requested font, processing stops. No substitution is done.

4. Any TrueType font that is to be used in an AFP system must be Unicode-enabled. All fonts installed by the Font Installer for AFP Systems are Unicode-enabled. For a description of the requirements for Unicode-enablement, see "TrueType Font Terminology" on page 84.

TrueType Fonts on OS/400 V5R2

You can use TrueType fonts on V5R2 systems. However, there are some differences between using these fonts on a V5R2 system as compared to using the fonts on a higher-level system.

One difference is that PSF does not support TrueType fonts on V5R2 systems, only Host Print Transform does. Also, there is no RAT available on V5R2 systems. Instead, the system maintains index tables that map the full font names to the actual font files stored in the integrated file system. The index table is built for all TrueType fonts contained in these directories:

- QIBM/ProdData/OS400/Fonts/TTFonts

- QIBM/UserData/OS400/Fonts/TTFonts

Because there is no RAT on V5R2 systems, linked fonts and font capturing are not supported on V5R2.

Migration notes:

For fonts in the /QIBM/UserData/OS400/Fonts/TTFonts directory, the base V5R3 implementation functions exactly the same as V5R2. Customers who are using TrueType fonts on V5R2 and do not want to use the new function provided with a RAT do not need to change anything when they migrate from V5R2 to V5R3. However, customers can choose to step up to the full functionality of the TrueType support by using the Font Installer for AFP Systems to install the fonts. This program generates a RAT when TrueType fonts are installed, and this enables the new functionality.

On V5R3 systems, the search order for full font names follows:
1. Search the RAT (if it exists) in /QIBM/UserData/OS400/Fonts/TTFonts.
2. Search the RAT (if it exists) in /QIBM/ProdData/OS400/Fonts/TTFonts.
3. Search all the TrueType font files in /QIBM/UserData/OS400/Fonts/TTFonts.
4. Search all the TrueType font files in /QIBM/ProdData/OS400/Fonts/TTFonts.

This lets the RAT take precedence over the V5R2 search method, but if there is no RAT, the old method still works.

Specifying Unicode Complex Text

OS/400 V5R3 provides a prototypical implementation of AFP support of Unicode complex text. The AFP datastream supports Unicode UTF-16 and UTF-8.You can use the DDS UNISCRIPT keyword to identify fields of Unicode text for complex text layout. In addition to marking the Unicode text for complex layout, this keyword provides a number of parameters to control the layout in these ways:
- Specify the base direction of the field for bidirectional reordering.
- Specify an alternate inline position for right-to-left text.
- Request normalization of Unicode text to composed forms.

For more information about DDS keywords, refer to the iSeries Information Center. From the Information center, go to Programming ► DDS ► DDS keyword finder.

Current IPDS printers do not support the PTOCA data stream control used to mark text for complex layout. The printer will report a NACK if complex text is encountered. To achieve complex layout, you must use the Host Print Transform (HPT) function to render the document. HPT performs complex text layout by interfacing with the set of layout APIs provided in i5/OS option 39, International Components for Unicode (ICU)[1]. HPT generates output as raster page images, which can be sent to image-capable printers, faxes, and viewers. To correctly render the text of a given script, two related requirements must be met:
- ICU must include a layout engine for the given script.
- The font must include the OpenType tables used by this layout engine.

For more information about the International Components for Unicode, refer to `http://www-306.ibm.com/software/globalization/icu/index.jsp`.

---

1. In V5R3, Option 39 provides version 2.6 of ICU.

Capturing TrueType Fonts

The Font Installer for AFP Systems can mark TrueType fonts as eligible for capture. However, this is not related to the Font capture flag available to AFP fonts. Two flags that are set in the RAT control font capture. For information about TrueType font capture, refer to *Using OpenType Fonts in an AFP System.*

Installing and Specifying TrueType Fonts: Summary

Using TrueType fonts in your installation is a straightforward process. This section sums up how to install and use the fonts.

To install a TrueType font, you can use the IBM Font Installer for AFP systems. This is a feature of Infoprint Fonts for Multiplatforms. You can also simply copy the fonts into /QIBM/UserData/OS400/Fonts/TTFonts. However, this method gives you less functionality. For details about TrueType font installation, see "Installing a TrueType Font on the iSeries" on page 85.

To specify a TrueType font in your document, use the DDS FONTNAME keyword to specify the TrueType font name. You can also use this keyword to specify other options, such as a code page. For details about specifying a TrueType font, see "Specifying TrueType Fonts" on page 86.

Where to Get TrueType Fonts

There are many sources of TrueType fonts. However, not all TrueType fonts are suitable for use in AFP. In general, a TrueType font that is to be installed and referenced in an AFP system must be Unicode-enabled. This characteristic is defined in "TrueType Font Terminology" on page 84 Refer to *Using OpenType Fonts in a AFP System* for a more complete technical description of the characteristic of a TrueType font that may be used in an AFP system.

These are two sources of TrueType fonts for the iSeries:

i5/OS Option 43 - Additional fonts

These fonts are shipped with i5/OS (installed with option 43 Additional fonts). Option 43 places these TrueType fonts in the integrated file system in /QIBM/ProdData/OS400/Fonts/TTFonts:

- Monotype Sans WT
- Monotype Sans WT J
- Monotype Sans WT K
- Monotype Sans WT ME
- Monotype Sans WT SC (see note)
- Monotype Sans WT TC
- Monotype Sans Duospace WT
- Monotype Sans Duospace WT J
- Monotype Sans Duospace WT K
- Monotype Sans Duospace WT ME
- Monotype Sans Duospace WT SC (see note)
- Monotype Sans Duospace WT TC
- Monotype Sans Duospace Ext B (see note)
- Times New Roman WT
- Times New Roman WT J

- Times New Roman WT K
- Times New Roman WT ME
- Times New Roman WT SC
- Times New Roman WT TC
- Thorndale Duospace WT
- Thorndale Duospace WT J
- Thorndale Duospace WT K
- Thorndale Duospace WT ME
- Thorndale Duospace WT SC
- Thorndale Duospace WT TC

Note: Option 43 includes a resource access table that links Monospace Sans Duospace Ext B to the base fonts Monotype Sans WT SC and Monotype Sans Duospace WT SC. The characters of Monospace Sans Duospace Ext B are thus available to documents that specify either of these base fonts.

WorldType Fonts for AFP Print Servers
A feature of Infoprint Fonts for Multiplatforms that supplies a rich set of TrueType fonts for installation on IBM print servers. For more information, refer to *IBM Infoprint Fonts: Font Summary*.

To install TrueType fonts on your iSeries, you should use the Font Installer for AFP Systems feature of Infoprint Fonts for Multiplatforms.

Differences Between AFP Fonts and TrueType Fonts

TrueType fonts differ from AFP fonts in how they are specified, managed, and installed.

Table 12. Differences Between AFP and TrueType Fonts

AFP Fonts	TrueType Fonts
AFP fonts are i5/OS objects.	TrueType fonts are stream files in the integrated file system.
DDS keyword FNTCHRSET is used to select AFP fonts.	DDS keyword FONTNAME is used to select TrueType fonts.
PSF uses a defined search algorithm to search for AFP fonts. It searches the library list associated with the job for a matching font.	TrueType fonts reside in one of two locations. • /QIBM/ProdData/OS400/Fonts/TTFonts contains IBM-supplied fonts • /QIBM/UserData/OS400/Fonts/TTFonts contains user fonts.
AFP fonts are created and managed using the font resource commands: CHGCDEFNT, CHGFNTRSC, CRTFNTRSC, DLTFNTRSC, DSPCDEFNT, DSPFNTRSCA, and WRKFNTRSC.	TrueType fonts have no i5/OS management commands. Instead, the fonts are installed using the Font Installer for AFP Systems feature of Infoprint fonts for Multiplatforms. The generated RAT resides in the /QIBM file system.
An AFP font is specified by using the *FNTRSC object name such as C0D0GT10.	A TrueType font is specified using a font name such as Times New Roman.
AFP fonts can be substituted when the requested font is not available.	There is no font substitution with TrueType fonts.
An AFP font is marked as eligible for capture with the Change Font Resource (CHGFNTRSC) command.	A TrueType font is marked as eligible for capture by the Font Installer for AFP Systems.

Table 12. Differences Between AFP and TrueType Fonts (continued)

AFP Fonts	TrueType Fonts
PSF will only try to capture AFP fonts if the PSF configuration object specifies FNTCAPTURE(*YES).	PSF will always try to capture TrueType fonts.

Chapter 8. Working with AFP Fonts

Fonts are used to represent text and sometimes bar codes. "AFP Fonts" on page 45 introduces fonts. This chapter describes how to use fonts on the iSeries. It contains these sections:

- "Create a Document with Several Fonts" gives an example of using fonts, employing several different composition methods.
- "Printing a Font Catalog" on page 94 describes the free AFP Font Collection Tools download. This helps you load AFP Font Collection fonts onto your iSeries and print a font catalog with samples of the available fonts.
- "Using Outline Fonts" on page 94 explains how to use outline fonts instead of raster fonts without changing your application.
- "Working with Font Mapping Tables" on page 94 explains how to change the font substitution tables.
- "Capturing Fonts" on page 95 explains how to mark fonts eligible for capture.
- "Anamorphic Font Character Scaling" on page 96 explains how to scale fonts without maintaining the original proportions.
- "Steps to Restore Font Libraries From the Font Collection or Infoprint Fonts CD to the iSeries" on page 96 explains how to install fonts from Infoprint Fonts and AFP Font Collection onto your system.

For information about installing and specifying TrueType fonts, see "Working with TrueType Fonts" on page 85.

Create a Document with Several Fonts

In this section, we will specify several different fonts in a document. There are many different tools you can use to do this. Each tool has different capabilities, use the tool that best fits your needs. These products are discussed in greater detail in Chapter 3, "AFP Applications," on page 19 and throughout the document. Chapter 23, "Deciding on an Output Strategy and Set of Tools," on page 247 can help you choose the best product for you.

DDS   You can use keywords in your DDS application to specify fonts; including how they look and how they are placed. The example in this section uses DDS.

Infoprint Designer
>This graphical tool lets you use menus to specify fonts and font properties, such as size and weight. You can also specify placement properties, such as alignment and orientation. Chapter 16, "Using Infoprint Designer," on page 165 gives an example of using Infoprint Designer.

AFP Printer Driver
>This driver can be used to produce AFP documents, overlays, and page segments from any Windows 95/98, Windows NT, or Windows 2000 application that supports printing to AFP printers.

AFP Utilities
>You can specify fonts in the components of AFP Utilities. Chapter 17, "Using the Print Format Utility," on page 185 gives an example of using AFP Utilities.

Third party applications

Several third party applications exist that you can use to work with fonts in a document. Some such products are Papyris, Elixir, Opus, StreamServe, and DOC1.

Example

In this example, we use RPG and DDS to specify several different fonts in a document. The fonts are different sizes, styles, orientations, and colors, and use different code pages to produce different characters. We also use TrueType and AFP fonts. The AFP fonts are both printer resident (FGID) and host resident (character set and code page) fonts that are fixed-pitch, proportional or typographic, as well as outline and raster fonts. The sample document is shown in Figure 35 on page 93. The DDS keywords used to create the document follow in Figure 36 on page 94.

Using Fonts With DDS

1

2

The brown fox jumped ABC123! ¤ #
Courier New, 20p
Code page 37
TrueType,   Outline

3

The brown fox jumped ABC123! ¤ #
Boldface
Character set C0S0BRTR, Code page T1V10037
Proportional, Host-Resident,   Raster

4

The brown fox jumped ABC123! ¤ #
Times New Roman, Italic, Bold, 18p
FGID 2311   Code Page 37 (default)
Typographic, Printer-Resident,   Outline

5

The brown fox jumped ABC123] ¤ #
Times New Roman, Italic, Bold, 18p
Character set C0N500H0, Code page T1V10500
Typographic, Host-Resident,   Raster

6

The brown fox jumped ABC123] ¤ Ñ
Times New Roman, Italic, Bold, 18p
Character set CZN500,   Code page T1V10284
Typographic, Host-Resident,   Outline

7

The brown fox jumped ABC123] € #
Times New Roman, Italic, Bold, 18p
Coded font X0N51EHC
    Character set C0N500H0, Code page T1001148
Typographic, Host-Resident,   Outline

8

The brown fox jumped ABC123! ¤ #
Helvetica, Roman, Medium,24ph 10pw
FGID 2304   Code Page 37 (default)
Typographic, Host-Resident,   Outline

9

The brown fox jumped ABC123] ¤ #
Helvetica, Roman, Medium,48ph 10pw
Character set CZH200,   Code page T1V10274
Typographic, Host-Resident,   Outline

10

THE BROWN FOX JUMPED ABC123]   # ♪ ♪ ♪
OCR-A
FGID 19   Code Page 37 (default)
Fixed Pitch, Host-Resident,   Raster

11

12

Figure 35. Document with Several Fonts

The fonts in the example have been specified using these DDS keywords. The numbered keywords below correspond to the numbering in the sample document.

```
Line 1:    FONT(2305 (*POINTSIZE 18)) COLOR(RED)
Line 2:    FONTNAME('Courier New' (*POINTSIZE 20)(*CODEPAGE T1V10037)) COLOR(GRN)
Line 3:    FNTCHRSET(C0S0BRTR T1V10037) COLOR(BLU)
Line 4:    FONT(2311 (*POINTSIZE18)) COLOR(PNK)
Line 5:    FNTCHRSET(C0N500H0 T1V10500) COLOR(*RGB 50 50 75)
Line 6:    FNTCHRSET(CZN500 T1V10284 (*POINTSIZE 18)) COLOR(*RGB 75 20 40)
Line 7:    CDEFNT(X0N51EHC) COLOR(*CMYK 0 50 50 0)
Line 8:    FONT(2304 (*POINTSIZE 24 10)) COLOR(*CMYK 50 0 0 50)
Line 9:    FNTCHRSET(CZH200 T1V10274 (*POINTSIZE 48 10)) COLOR(TRQ)
Line 10:   FONT(19) COLOR(BRN)
Line 11:   FONT(420 (*POINTSIZE 18 50)) COLOR(RED) TXTRTT(270)
Line 12:   FONT(420 (*POINTSIZE 18 50)) COLOR(RED) TXTRTT(90)
```

Figure 36. DDS Keywords Used to Create Sample Document

Notes:

1. The TXTRTT keyword only works with fields, not constants.

2. The print data for lines 1 through 10 is constant text and was specified in the DDS source.

3. The print data for lines 11 and 12 is a data field that contains the printed text.

For more information about DDS keywords for printing, refer to the *DDS Reference: Printer Files* topic in the iSeries Information Center. To find the topic, from the Information Center iSeries search for "DDS Reference".

Printing a Font Catalog

IBM iSeries AFP Font Utilities is a free download that contains commands that help you load fonts from Infoprint Fonts or AFP Font Collection onto your iSeries and print a font catalog with samples of the available fonts. You can use the commands if you meet these criteria:

- You can transfer files from your PC to an iSeries using FTP.
- You have Infoprint Fonts or the AFP Font Collection.
- You use PSF for i5/OS to print to an IPDS printer.

You can get the tools from: `http://www-1.ibm.com/support/docview.wss?uid=tss1flash10380`. This Web page also has instructions about loading and using the tools.

Using Outline Fonts

If you have an application that currently uses downloadable AFP raster fonts and you want to use equivalent downloadable outline fonts when possible, you can request that substitution without changing the application. To do this, use the USEOUTLFNT parameter on a PSF configuration object, then specify that PSF configuration object on the printer device you are using.

Working with Font Mapping Tables

Font mapping tables tell the i5/OS how to map AFP fonts when a requested one cannot be found. They are not used for TrueType fonts. You can use the i5/OS commands listed below to work with font mapping tables, with these restrictions:

Restrictions:

1. You cannot change system font mapping tables.

2. You can only create one font mapping table of each kind, except printer-resident to printer-resident.

3. Host-to-printer and printer-to-host font mapping tables are given one of these names as appropriate: *PHFCS, *HPFCS, *PHCP, *HPCP as appropriate, and are stored in QUSRSYS.

Careful: Because improper use of font substitution of AFP fonts can cause unpredictable results, only system administrators should work with the font mapping tables.

Add font table entry (ADDFNTTBLE)
Adds an entry to a user-defined font mapping table. For example, `ADDFNTTBLE FNTTBL(*PHFCS) PHFCS((NNN *NONE) (CHAR_SET *OUTLINE))` maps the printer font identifier *NNN* to the outline font character set *CHAR_SET*. *NONE is specified for point size because the host character set is an outline font.

Change font table entry (CHGFNTTBLE)
Changes an entry in a user-defined font mapping table. For example, `CHGFNTTBLE FNTTBL(*HPFCS) HPFCS((CHAR_SET) (NNN))` specifies that the host font character set *CHAR_SET* is now mapped to the printer font identifier *NNN*, instead of the previously used printer font identifier.

Create font table (CRTFNTTBL)
Creates a user-defined font mapping table. You can only have one font mapping table of each kind except printer-to-printer. For example, `CRTFNTTBL FNTTBL(*PHFCS)` creates the user-defined PHFCS font mapping table if one does not already exist.

Delete font table (DLTFNTTBL)
Deletes any user-defined font mapping table. For example, `DLTFNTTBL FNTTBL(*PHFCS)` deletes the user-defined PHFCS font mapping table.

Display font table (DSPFNTTBL)
Displays any font mapping table at the requesting work station or prints it with the job's spooled output. For example, `DSPFNTTBL FNTTBL(*SYSPHCP)` displays the system PHCP font mapping table on your screen.

Remove font table entry (RMVFNTTBLE)
Removes an entry from a user-defined font mapping table. For example, `RMVFNTTBLE FNTTBL(*HPCP) HPCP(CDE_PAG)` removes the entry that mapped the host code page *CDE_PAG* to a printer code page.

Capturing Fonts

Captured fonts are host-resident fonts that are captured by the printer and treated as printer-resident fonts as long as there is room for them. This can improve performance by reducing font downloads to printers that support font capture. It is possible that an unauthorized person could access the captured font. Therefore, you should not mark sensitive fonts, such as signatures and MICR fonts, as eligible to be captured.

Careful: Because improper use of font capturing can cause unpredictable results, only system administrators should handle the font capture feature. Refer to the iSeries Information Center for information about the proper use of font capturing.

For AFP fonts, font capturing is turned on in a PSF configuration object. You can use i5/OS commands or AFP Manager (a feature of iSeries Navigator) to activate font capturing. You can also use iSeries Navigator to enter i5/OS commands. For instructions, refer to *Infoprint Server for iSeries: User's Guide*.

To activate font capturing for AFP fonts using i5/OS commands, follow these steps:

1. Mark the font eligible for capture. To do this, specify FNTCAPTURE (*YES) in the appropriate font resource command. You can specify this value on a new font character set or code page by using "Create font resource" (CRTFNTRSC) or change a font character set or code page by using "Change font resource" (CHGFNTRSC). For example, to mark the existing font character set CHR_SET eligible for capture, enter this command:

   ```
   CHGFNTRSC FNTRSC(CHR_SET) FNTCAPTURE(*YES)
   ```

2. Activate font capturing. To do this, specify FNTCAPTURE(*YES) on a PSF configuration object. You can specify this value on a new PSF configuration object by using "Create PSF configuration object" (CRTPSFCFG) or change a PSF configuration object by using "Change PSF configuration object" (CHGPSFCFG). For example, to activate font capture in the PSF configuration object named MY_CFG, enter this command:

   ```
   CHGPSFCFG PSFCFG(MY_CFG) FNTCAPTURE(*YES)
   ```

To use AFP Manager to activate font capture for AFP fonts, follow the steps in "Activating Font Capture" on page 279.

Anamorphic Font Character Scaling

Anamorphic font character scaling lets you stretch or compress a character, disregarding the font's original proportions. By default, i5/OS scales fonts proportionally - scaling the width and height the same amount. You can scale outline fonts anamorphically with one of these tools:

DDS Keywords
> You can use these DDS keywords to scale fonts:
> - **CDEFNT, FNTCHRSET, and FONT** allow you to scale resident and downloaded outline fonts. Use one of these keywords if you have an AFCCU printer.
> - **CHRSIZ** lets you scale GDDM graphic characters, printer-resident outline fonts, and downloaded outline fonts.

Infoprint Designer
> You can use the Width field in the font dialogs (such as the Font1 and Font2 pages on the "Field properties" dialog) to control outline character scaling.

Steps to Restore Font Libraries From the Font Collection or Infoprint Fonts CD to the iSeries

Follow these steps to restore CPL300 from the CD to library QFNT300CPL on the i5/OS. A free download, IBM iSeries AFP Font Utilities, also has commands for installing fonts from Infoprint Fonts or Font Collection on your iSeries. Refer to this Web page http://www-1.ibm.com/support/docview.wss?uid=tss1flash10380 for more information.

1. To see the libraries that are on the Font Collection or Infoprint Fonts CD:
   a. Place the CD in the iSeries CD drive.
   b. On a command line, enter WRKOPTDIR. The Work with Optical Directories screen opens.
   c. In the **Opt** column for the Infoprint Fonts or Font Collection CD, specify option 8 (work with files). The Work with Optical Files screen opens and

displays a list of all files on the CD. The commonly installed Infoprint Fonts and Font Collection files are listed in Table 6 on page 53.

2. To restore that file to an i5/OS library, enter this command:

```
RSTLIB SAVLIB(Font_file_name) DEV(your_iSeries_CD_device_name)
     RSTLIB(i5/OS_library)
```

For example, to restore the Font Collection file CPL300 to the library QFNT300CPL on an iSeries where OPT01 is the CD device, use this command:

```
RSTLIB SAVLIB(CPL300) DEV(OPT01) RSTLIB(QFNT300CPL)
```

3. Check to see if the restore was successful.

   a. Enter WRKLIB QFNT300CPL

   b. Specify option 12 (Work with objects) to see the objects in the library.

4. Repeat steps 2 and 3 for all desired font libraries.

Chapter 9. Working with Images

Images are key components in creating advanced electronic print and presentation applications. They can be used to improve the look and effectiveness of output, can be an essential part of the document, or can actually be part of the application. Images are raster patterns of pels that make up a picture. "Images and Graphics" on page 63 introduces images.

This chapter describes how to create images and how to get images into a format you can use in your documents. It also introduces some different options for including images in your iSeries output.

Building Images

Creating an image for i5/OS printing applications involves several steps, from scanning the source document to creating the page segment object. The steps are:

1. "Scanning the Source Image"
2. "Touching up the Image"
3. "Converting Images to IOCA" on page 102
4. "Uploading and Compiling the Image" on page 104

Note: There are also services available from IBM to build image objects for your i5/OS applications.

Scanning the Source Image

The first step in creating an image for use with i5/OS documents is to get an electronic version of the image. Scanning an image converts the source document into digital format. Some scanning software writes the digitized image to a file, in an image format such as TIFF. Other software can pass the digitized image directly to an editing program.

The quality of the source document is essential in getting a good scanned image. The artwork to be scanned should be high-contrast, black and white reproductions. Signatures with medium black felt tip pens on white paper should scan well.

Note: Scanning should be done in the same resolution that the image will be printed in.

Touching up the Image

After scanning, images normally need some touch-up to become clear and sharp. Touching up removes the imperfections in the scanning process.

There are many software choices for image editing. Many Windows programs process image file formats and support image editing. A number of programs, such Infoprint Designer for iSeries, are part of dedicated systems used to build AFP image and forms. Whatever the tool, the touch up process consists of turning on or off black and white pels to create a sharp, clear image. Below, we show how to use Infoprint Designer to touch up an image.

Figure 37 on page 100 shows the window that opens upon starting the Image Editor component of Infoprint Designer.
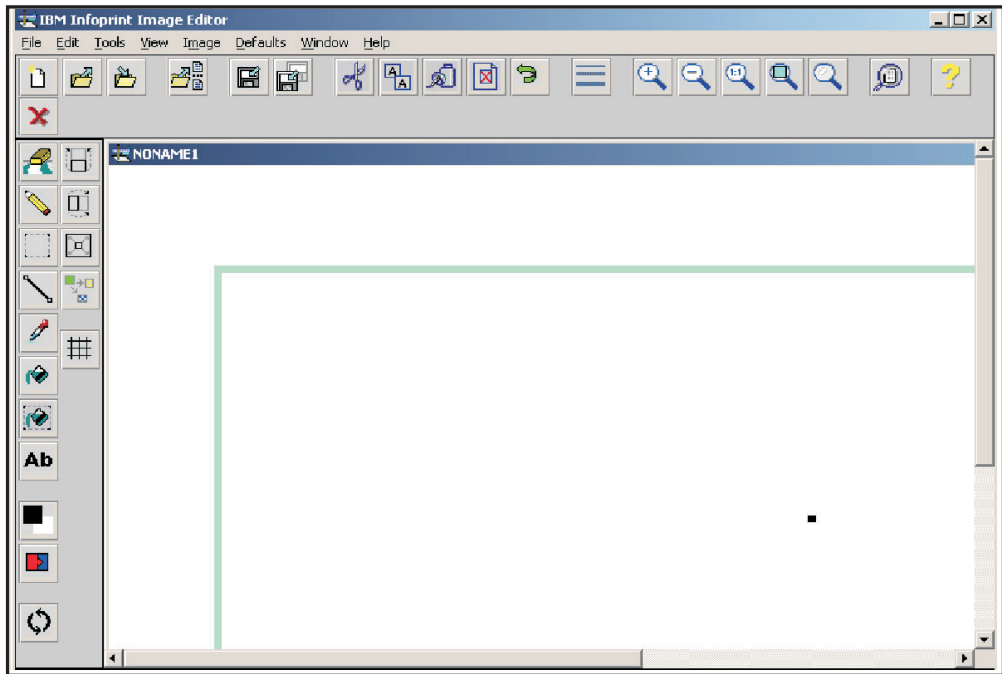
Figure 37. Image Editor

You can scan an image into the editor or open an existing AFP, TIFF, BMP, JPEG, GIF, ICO, or PTR image. Figure 38 shows the Super Sun Seeds logo image as scanned into the Image Editor component of Infoprint Designer. Most image systems like the Image Editor have a series of image touch-up tools with varying levels of granularity that let you work down to the individual pel level.
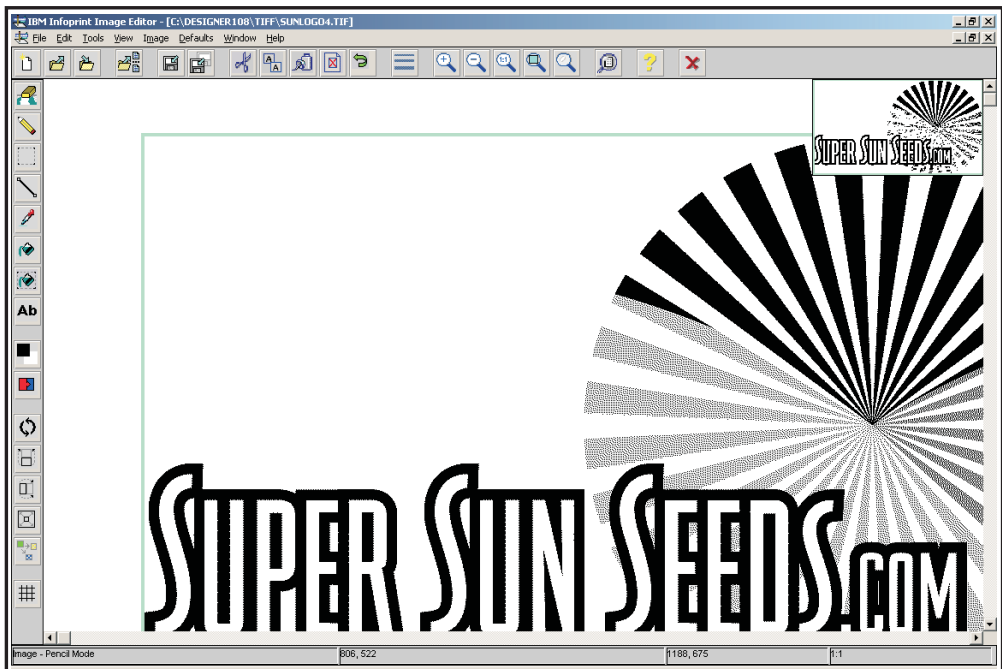
Figure 38. Super Sun Seeds Logo Scanned into the Infoprint Designer Image Editor

Because the Super Sun Seeds logo will be used in 300-pel resolution, each square inch will have 90,000 individual dots or pels. Therefore, it is necessary to zoom in on this image to work with it effectively.
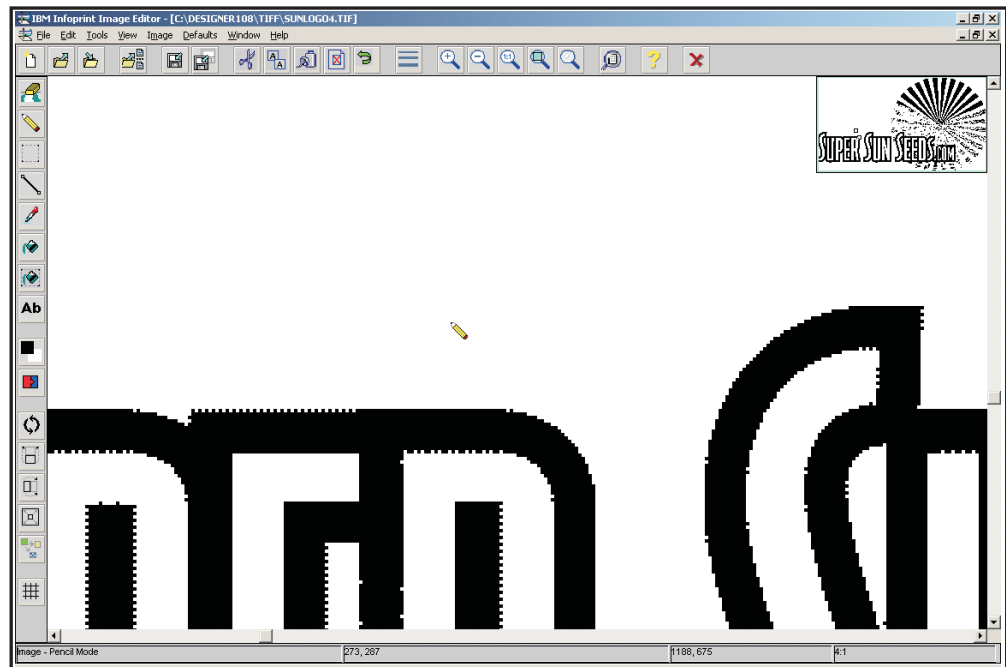
Figure 39. Zooming in on the Super Sun Seeds Logo Image

Figure 39 shows how the tops of the letters "PER" look when they are magnified. Notice that at this level the rounded letters look far less rounded. Any patterns that are not exactly horizontal or vertical will exhibit a "stairstepping" effect at this level of detail. The goal is to smooth out these patterns as much as possible and to remove extraneous pels.

There are several exceptions to the above touch-up process:
- Signatures, as legal images, should only have extraneous black and white pels cleaned up.
- Documents such as check images are taken as is.
- Images that have not been scanned, such as images pulled from clip art or images transformed to AFP with the Infoprint Server image transforms, do not require touch-up.
- Watermarks; grayscale images meant to blend into the background of an electronic document, do not require touch-up.

Image Size:

In some cases, you need the image in several different sizes. For example, a company logo might be used in different sizes in several different documents. For these situations, you might need a page segment in each size that you need. With DDS, you can re-size page segments, although the page segment is sent to the printer each time it is used in a new size. You have these options for creating the page segments in various sizes:
- Work with camera-ready artwork in each size and go through the imaging process (scan, touch-up, upload, object creation) for each size.

- Scan and touch up one size, then use the imaging software to create additional sizes. Because most images are degraded as they are enlarged, you should touch up the largest size you will need. Infoprint Designer resizes image objects on iSeries. Most PC imaging products also provide for resizing image objects.

Image Orientation:

Another image consideration is orientation, or the direction of the image relative to the general direction of the page. The four orientations are 0, 90, 180, and 270 degrees. These orientations are also referred to as *across*, *down*, *back*, and *up*, named by the way text in the image appears with respect to a portrait page in each rotation. For most printers, a page in landscape format is oriented 90 degrees. In this case, an image would also have to be oriented 90 degrees in order to appear correctly.

You might need a page segment in each orientation you need. With DDS, you can rotate page segment, although the page segment is sent to the printer each time it is used in a new orientation. Resource Management Utility creates page segments in any or all of the four orientations. Most PC imaging products also have this capability.

Converting Images to IOCA

The next step in creating an image is to convert it to a usable format. You usually need an IOCA version of the image to use it in i5/OS documents.

At this point, the image is either sitting in the image editor or is in image file format. You can use several different products to get your image in IOCA format:

- Infoprint Designer
- The Infoprint Server image (GIF, TIFF, and JPEG) to AFP transforms, see 103.
- The IBM AFP Printer Driver for Window, see 103.

Creating a Page Segment with Infoprint Designer

You can use Image Editor and Infoprint Designer together to convert a scanned image or a TIFF, BMP, JPEG, GIF, ICO, or PTR image to an AFP IOCA page segment. Follow these steps:

1. In the Image Editor, from the **File** menu select **Open**. Specify the image you want to convert.
2. Make any changes you want.

   To use it with Infoprint Designer, it must be black and white. To convert a color image to black and white, from the **Image** menu select **Dither**. In the Dithering parameters window, select **Color B/W** and click **OK**.
3. Save the image in AFP format. From the **File** menu, select **Save as**. In the window that opens, specify the location and file name. For use with Infoprint Designer, it is best to specify *name.300* for the file name. Ensure that **AFP image** is specified for **Save as type**.
4. In Infoprint Designer, from the **File** menu, select **Get image**. Specify your page segment in the window that opens.
5. When you are done working with the project, from the **File** menu select **Upload to AS/400**. On the AS/400 page, ensure that in the Send area, **Page Segments** and **Replace** are specified.

Creating an Image Resource with the Infoprint Server Image Transforms

With Infoprint Server for iSeries, you can transform a GIF, JPEG, or TIFF image file on your workstation to an AFP page segment, overlay, or document.

Before you begin:

You must install the image transforms and complete any setup steps that are appropriate to your installation. For instructions, refer to *Infoprint Server for iSeries: User's Guide*.

To create an AFP page segment from an image file, enter this command from the directory in which the input file resides:

```
xxxx2afp filename -pagetype pseg -o output_filename
```

Where:

xxxx is gif, jpeg, or tiff, as appropriate.

filename is the name of the input file.

output_filename is the name of the output file to create. You can also specify the path to use.

Example:

This example transforms a GIF file called sunlogo.gif into an AFP page segment called sunlogo.300. There is a network drive mapped to \\MyIseries\QDLS. After creation, the page segment is stored in the specified directory in the integrated file system. Enter this command at a DOS prompt:

```
gif2afp sunlogo.gif -pagetype pseg -o \\MyIseries\QDLS\psegs\sunlogo.300
```

For more information about Infoprint Server for iSeries and its image transforms, refer to *Infoprint Server for iSeries: User's Guide* or this Web page: `http://www.printers.ibm.com/R5PSC.NSF/Web/ipserv400Home`.

Creating an Image Resource with the IBM AFP Printer Driver for Windows

The IBM AFP Printer Driver for Windows creates AFP documents, page segments, and overlays out of any Windows output. This driver is part of iSeries Access and is also available free on an "as is" basis from IBM.

Like any Windows driver, the IBM AFP Printer Driver for Windows uses the Windows GDI (Graphical Data Interface) and maps Windows document elements to AFP. As such, it is an "intelligent" driver. It can map fonts to fonts and lines and boxes to lines and boxes. Where image output is required, the driver uses compressed image. This means that more efficient overlays are created for use on your i5/OS.

Before you begin:

If you do not have iSeries Access, you must download and install the IBM AFP Printer Driver for Windows. To download the driver, refer to this Web page: `http://www.printers.ibm.com/R5PSC.NSF/Web/afp_printer_driver`. Instructions for installing the driver are also available on that Web page.

Steps to create a page segment or overlay:

> **Note:** These are steps for using the Windows Paint program on Windows NT. The process is similar for any Windows image application.

1. From the menu bar, select **File** then **Print...**.
2. By **Name**, select **IBM AFP 300** or the AFP device installed.
3. Select **Print to file**.
4. Click **Properties**.
5. Under document options, select **Output Type** then select **Page segment** or **Overlay**, as appropriate.
6. Under document options, select **Clip Limits** then click **Clip Limits...**.
7. On the Clip Limits dialog, select **Offset plus size** and click **OK**.
8. Select any other options you want. For example, to select color options, click **Image Options...**.
9. For help at any time press **F1**.
10. Click **OK** on the Properties window.
11. Click **OK** on the Print window.
12. When prompted for the file name, specify the name of a specific shared folder if you want to use CL commands to transfer the file to your i5/OS. For example, `i:\qdls\resource\sunlogo`.
13. Click **OK**.

Uploading and Compiling the Image

Once the image file is created on the workstation and resides in an i5/OS folder, it must be transferred to a temporary physical file and then created as an i5/OS page segment or overlay object. You can use one of these methods:

- "Using Infoprint Designer to Upload and Compile an AFP Image"
- "Using AFP Manager to Upload and Compile an AFP Image"
- "Using CL Commands to Upload and Compile an AFP Image" on page 105

> **Note:** When you upload an object to the i5/OS, it replaces any file with the same name in the destination library.

Using Infoprint Designer to Upload and Compile an AFP Image

To upload and compile an AFP page segment or overlay with Infoprint Designer, follow these steps:

1. From the **File** menu, select **Upload to AS/400...**.
2. The **Upload** dialog opens. The default destination library is specified on the **Preferences** dialog, but you can specify a different library in the **Upload** dialog.

Using AFP Manager to Upload and Compile an AFP Image

Follow these steps to transfer the AFP page segment or overlay to the i5/OS and create it as an i5/OS object.

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to an i5/OS.
4. Expand **AFP Manager** then **Resources**.
5. Right-click the image resource type (**Page Segments** or **Overlays**) and select **Import**.
6. Fill in the fields as appropriate. **Source file** is the name and location of the resource on the workstation. Use **Resource name** and **Library** to specify what to name the image resource on the i5/OS and where to store it.
7. For help press F1 or click **Help**.
8. Click **OK**.

Using CL Commands to Upload and Compile an AFP Image

Follow these steps to transfer an AFP resource to your i5/OS.

1. Make sure that the PC AFP resource is in *system*\QDLS\, where *system* is the name of your i5/OS. If the AFP resource is not in that directory, map a network drive to your i5/OS system then use Windows Explorer to move the file.

2. Create a physical file to receive the PC resource. The suggested record length (RCDLEN) is 8201 and level check (LVLCHK) must be *NO (this is the default value). On the command line, specify this:

   `CRTPF FILE(`*lib/file*`) RCDLEN(8201)`

   Example:

   In this example, the physical file name is PAGESEG and the library is MYLIB:

   `CRTPF FILE(MYLIB/PAGESEG) RCDLEN(8201)`

3. Copy the PC resource into the physical file on the i5/OS by specifying:

   `CPYFRMPCD FROMFLR(`*folder*`) TOFILE(`*library/file_name*`) FROMDOC(`*resource_name*`) TRNTBL(*NONE)`

   Where: *folder* specifies the name of a folder or folder path containing the PC resource. *file_name* and *library* are the same values you specified in the previous step. *resource_name* is the name of the PC resource.

   Example:

   In this example, the Windows folder RESOURCE contains the resource SUNLOGO.IMG. The resource will be copied into the i5/OS physical file PAGESEG in MYLIB, which was created in step 2.

   `CPYFRMPCD FROMFLR(RESOURCE) TOFILE(MYLIB/PAGESEG) FROMDOC(SUNLOGO.IMG) TRNTBL(*NONE)`

4. Create the resource.
   - To create a page segment, specify:

     `CRTPAGSEG PAGSEG(`*pagseg_library/pagseg_name*`) FILE(`*library/file_name*`) MBR(`*file_name*`)`

   - To create an overlay, specify:

     `CRTOVL OVL(`*ovl_lib/ovl_name*`) FILE(`*library/file_name*`) MBR(`*file_name*`)`

   pagseg_library/pagseg_name and *ovl_lib/ovl_name* specify the name and library of the resource that is created. *library/file_name* are the same values you specified in step2.

   Example:

   In this example, the page segment SUNLOGO is created in MYLIB from the file PAGESEG, which is also in MYLIB.

   `CRTPAGSEG PAGSEG(MYLIB/SUNLOGO) FILE(MYLIB/PAGESEG) MBR(*PAGSEG)`

Including Images in your i5/OS Output

The image in i5/OS page segment objects can be built into your application output in a number of ways, including:
- Invoking it in the printer file DDS
- Placing it in an AFP Utilities overlay
- Referencing it in any i5/OS overlay
- Placing it in a print application with the AFP Utilities Print Format Utility
- Placing it in an Infoprint Designer overlay
- Specifying it within a page definition or form definition
- Using it directly in AFP data streams

Chapter 10. Working with Overlays

An overlay, or electronic form, is a collection of constant data stored as an AFP resource and primarily used in place of preprinted forms. Using overlays instead of pre-preprinted forms gives you greater flexibility, lets you change forms quickly and without waste, eliminates storage space needed for pre-printed forms, and decreases operator intervention needed to print forms. There are several different tools you can use to design overlays. These tools, along with considerations for designing overlays, are discussed in this chapter.

Overlay Design Considerations

With most electronic forms, the design process includes some amount of planning, measuring, and positioning. Typically, you need to:

- Determine the positioning of key elements (you can use a positioning grid overlay to aid in this process).
- Determine the fonts to be used.
- Design and create any images to be placed within the overlay.
- Determine the design sequence, particularly if the overlay has many contiguous lines and boxes.
- Ensure that overlay elements map to the application data.
- If you have a series of forms that are similar, consider breaking out common sections into a partial overlay, or sub-form. This approach will also reduce the maintenance of these forms.

In the Super Sun Seeds example, the application data is produced in traditional row and column format, with standard vertical spacing of 6 lines per inch and 10 characters per inch horizontally. If the overlay is designed with the same measurement grid, then it should match with the application data and be far easier to produce.

Performance Considerations

Printing a full-page image document at high resolutions requires significantly more processing on the part of the i5/OS and the printer than printing one line at low resolution. Performance is not usually a concern in the line-mode printing process, but it is certainly a consideration when you are building and printing electronic documents.

AFP, with its structured data stream, object-based architecture, high-function print managers, and integrated printers, provides a major performance advantage. The overall process of printing is divided into its component parts. For example, IPDS printers offload from the i5/OS the work of translating font, image, and bar code objects into fully resolved (that is, complete bit patterns ready to print) document pages. Additionally, PSF keeps track of what font, image, and overlay resources are already stored in the printer.

Still, it is important to design applications with performance in mind. Because overlays include most of the elements of an electronic output document, performance factors should be considered, but be balanced against the business or design requirements of the application.

The performance notes below are just recommendations, and you might not want to follow all of them. Implementing all of these performance recommendations might create a high-performance electronic overlay, but an ineffective document. In addition, your operational environment should also be considered. If you are printing 1000 Super Sun Seeds invoices, then a few extra seconds at the start of the print job will not matter. However, if your application is printing only one invoice at a time, then every second at job initialization is another second of waiting for that one invoice to print.

These can all affect performance:

Fonts

When i5/OS host-resident fonts are downloaded to the printer, time and printer memory usage are a factor. Large raster fonts and large numbers of fonts can slow performance. Consider doing the following:

- Minimize the number of fonts used. Document effectiveness normally suffers when more than 6-8 fonts are used on a page.
- Standardize fonts used across applications. Setting some organizational standards with respect to fonts will improve both performance and document effectiveness.
- Use outline fonts. Outline fonts have one scalable object for all point sizes. Raster fonts have a separate object for each point size. As more outline fonts become available on i5/OS (both host and printer-resident), consider using them instead of their raster equivalents.
- Use printer-resident fonts. Printer-resident fonts eliminate the download time that host-resident fonts require. Refer to the iSeries Information Center for more information about printer-resident fonts.
- Use font capturing. Font capturing enables the printer to dynamically store a host-downloaded font. The captured font then acts like a printer-resident font. Printing performance is improved by eliminating subsequent font downloads to the printer. The performance improvement will be especially noticeable if you are using double-byte fonts. "Capturing Fonts" on page 95 describes how to enable this function.

Images

Because of sheer size, images can affect performance in transmission, printing, and printer memory requirements.

Consider doing the following:

- Minimize the use of images. Do not use larger size page segments than the document requires.
- Use compressed images when possible. Be sure that you have created compressed images when creating IOCA page segments. Note that some older printers do not support compressed images.
- Use the same image across applications. If possible, standardize your logo to one size so that it may be used with little performance cost across applications.

Object Size

Certain design or object creation processes may generate larger than expected overlay or image objects. For example, a large page segment might indicate that it was created without image compression, or some overlay characteristics such as shading may affect object size or object performance.

Designing Overlays Using Infoprint Designer

Infoprint Designer's overlay capabilities are all you need to create electronic forms. You can either draw the forms with the Overlay Editor, trace over an existing scanned (TIFF) image of your pre-printed form, or import an AFP overlay object from your iSeries. Then, use Infoprint Designer to create overlay projects containing one or more electronic forms created with the Overlay Editor. For more details, including an example, see Chapter 16, "Using Infoprint Designer," on page 165.

Designing Overlays Using DDS

DDS provides most of the elements used in designing electronic forms, such as fonts, lines, boxes, images, and bar codes. For some applications, it may make sense just to use DDS to build all or part of the overlay. For example, simple forms, such as letterheads, are easily created with DDS. A more common application would involve electronic documents in which portions of the document are handled by an overlay and portions are handled by DDS. You also can use DDS to construct "floating" overlays. A floating overlay is one in which part of the form is placed at different locations on the output page. See "Floating Document Elements" on page 147 for an example of a floating overlay.

Creating Overlays from Existing Images

You can create overlays with a Windows application then transfer them to the i5/OS for use with iSeries applications. Figure 40 on page 110 shows INVBAC, the terms and conditions overlay for the Super Sun Seeds invoicing application.

Terms and Conditions

The sale of the products described herein shall be governed by the terms and conditions contained in any written contract currently in effect between Buyer and Seller covering such sale. If there is no such contract, then Seller hereby offers to sell such products to Buyer only upon the terms set forth herein.

1. Seller's standard prices in effect at the time of shipment will govern the sale of the products described herein. Terms of payment on any approved order are net thirty (30) days from the date of invoice unless otherwise specifically stated. All shipments, unless specifically provided, shall be f.o.b. place of manufacture or warehouse location indicated hereon. The price includes cost of packaging for domestic shipment, unless otherwise stated. An additional charge will be made for special domestic or export packing if this involves greater expense. Shipments will be insured at the expense of the Buyer unless Buyer specifically requests that shipments not be insured.

2. Seller reserves the right among other remedies either to terminate this contract or suspend further deliveries under it in the event Buyer fails to pay for any one shipment when same becomes due. Should Buyer's financial responsibility become unsatisfactory to Seller, cash payments or satisfactory security may be required by Seller for future deliveries and for goods theretofore delivered.

3. In addition to the purchase price, Buyer shall pay the Seller the amount of all taxes, excises or other charges (except taxes on or measured by net income) that Seller may be required to pay to any Government (national, state or local) with respect to the production, sale or transportation of any product delivered thereunder, except where the law otherwise provides. Sixty (60) days written notification must be given to make any changes to delivery schedule.

4. Seller warrants that products delivered hereunder will conform to the description on the face of this document and meet any specifications set forth or incorporated by reference herein and will be adequately contained, packaged and labeled and conform to any promises and affirmations of fact made on the container and label. Seller further warrants any such product against defects in workmanship or materials which develop or become evident within 12 (8 months OEM) after shipment of the product by Seller provided Seller's responsibility under this warranty shall be limited to the repair or if Seller so elects the replacement of the defective product or component thereof and that said warranty is subject to the following exceptions and conditions:

(a) All items claimed to be defective must be returned to Seller, transportation charges prepaid and will be returned to Buyer transportation charges collect unless found to be defective in which case Seller will pay all transportation charges.

(b) Seller's warranty will not apply to items which have been modified or repaired without Seller's written consent by persons other than Seller's authorized service personnel.

5. It should be noted that Seller has used the powerful tools of AS/400 Advanced Function Printing to create Seller's invoice, and despite the arcane terms and conditions which are presently being read, the invoice is a very effective business document. Any attempt to mar the appearance of this invoice should be discouraged.

6. The validity, interpretation and performance of the terms hereof with respect to any product delivered (or to be delivered) hereunder shall be governed by the law of the State of Colorado....

7. No modification or waiver of the terms here of shall be binding upon Seller unless approved in writing by on of Seller's Officers or Marketing Managers or shall be affected by acknowledgment or acceptance of purchase order forms containing other or different terms whether or not signed by authorized representative of Seller. (e) Seller does not warrant items which have been damaged due to negligence or misuse.

8. THERE ARE NO EXPRESS WARRANTIES BY SELLER OTHER THAN THOSE SPECIFIED IN THIS PARAGRAPH. NO WARRANTIES BY SELLER (OTHER THAN WARRANTY OF TITLE AS PROVIDED IN THE UNIFORM COMMERCIAL CODE) SHALL BE IMPLIED OR OTHERWISE CREATED UNDER THE UNIFORM COMMERCIAL CODE, INCLUDING BUT NOT LIMITED TO WARRANTY OF MERCHANTABILITY IN OTHER RESPECTS THAN SPECIFIED IN THIS PARAGRAPH AND WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE. Without limiting the generality of the foregoing, Buyer assumes all risk and liability for the results obtained by the use of any products delivered hereunder in combination with other articles or materialor in the practice of any process.

9. NO CLAIM of any kind with respect to any product specified herein, whether as to product delivered or for nondelivery of product and whether or not based on negligence, SHALL BE GREATER IN AMOUNT than the purchase price of the product in respect of which such claim is made. In no event shall either party be liable for special indirect or consequential damages whether or not caused by or resulting from the negligence of such party.

10. It is expressly understood that any technical advice furnished by Seller with reference to the use of its products is given gratis and Seller assumes no obligation of liability for the advice given or results obtained, all such advice being given and accepted at Buyer's risk.

11. In the event Buyer fails to fulfill Seller's terms of payment for the products specified herein, or in case Seller shall have any doubt at any time as to Buyer's financial responsibility, Seller may decline to make further deliveries except upon receipt of cash or satisfactory security.

Figure 40. Terms and Conditions Overlay Created in a Windows Application

This overlay was created using a Windows application. To maximize the performance and efficiency of the overlay, it was built using Expanded Core fonts (TrueType or Adobe Type Manager - ATM) that map directly into AFP fonts. Specifically, the text is in Helvetica Italic Medium and Helvetica Italic Bold typefaces in whole number point sizes.

If you created the overlay on your workstation as a GIF, JPEG, or TIFF file, you can use the Infoprint Server image transforms to transform the image file to an AFP overlay. However, this creates an all-image overlay, so this method is best for an overlay that is not all text. For information about using the Infoprint Server image transforms, see "Creating an Image Resource with the Infoprint Server Image Transforms" on page 103 or refer to *Infoprint Server for iSeries: User's Guide*.

Alternatively, you can use the AFP print driver to create the AFP overlay. See "Creating an Image Resource with the IBM AFP Printer Driver for Windows" on page 103 for instructions.

You can then transfer the overlay to your i5/OS by using AFP Manager or i5/OS commands. "Uploading and Compiling the Image" on page 104 contains these instructions.

Using Overlays with i5/OS Output

Overlays can be included in i5/OS print applications using many different techniques, including:

- Specifying them as front or back overlays in the printer file
- Specifying them directly with the DDS OVERLAY keyword
- Placing them in a print application with the Print Format Utility (a module of AFP Utilities)
- Specifying them within a page definition and form definition object
- Using them with an Infoprint Designer layout
- Using them as cover sheets in Facsimile Support for iSeries (*AFPDS spooled files only)

Chapter 11. Working with Bar Codes

Bar codes represent characters with sets of parallel bars or in a two-dimensional matrix. They can be an essential part of your output. "Bar Codes" on page 69 introduces bar codes.

All of the major bar code symbologies are supported on i5/OS directly, using BCOCA. Most of the AFP application enabling tools, such as DDS, provide an interface for specifying bar codes. The figures in this chapter are examples of bar code printing using the DDS BARCODE keyword.

This chapter describes how to best implement bar codes in your installation. It lists considerations for deciding what kind of bar code to use and describes several different ways to specify bar codes in your documents.

IPDS provides an interface to its printers that enables the mixture of different data types, including text, image, graphics, and bar codes. The data carried by each of these types is defined by a data object. The bar code object contains BCOCA data controls that describe a specific bar code, supply the data to be coded, and enable the IPDS printer to decide what is needed to construct and print the bar code.

Because the printer constructs the bar code, the same IPDS commands sent to IPDS printers from different technologies produce similar output. This lets you write the bar code application with little concern about what IPDS printer will be used for output.

Figure 41 on page 114 shows Postnet and Interleaved 2 of 5 bar codes on the Super Sun Seeds sample invoice.

400 CPU Parkway
Vegetation, NJ 55090

SUPER SUN SEEDS.COM

Office: 555-499-2367
Fax: 555-415-9794

LOS ARBOLES DEL MUNDO
32483 ARBOL LANE
MESA VERDE
IL 65478-9390
                  -- Sold To --

SAME

                  -- Ship To --

Bar Code

| Customer Number: | 141 | Invoice Number: | 31341 | Invoice Date: | 7/28/02 | Payment Date: | 8/28/02 |

Ship Via: Ship Date: 7/28/02   Terms: N10   Rep: MICHELE GOODACRE

	UOM	Item #	Item Description	Price	Extension
1000	BX	56413213	POT POT	7.65	7,650.00
45	BZ	11005015	CHANTENAY SEEDS	2.19	98.55
900	EA	00001200	ARBOLES DEL SUR	45.00	40,500.00
98	PK	84512023	OREGON SPRING TOMATO SEED	.97	95.06
4	BX	11057893	AFRICAN DAISY, SEEDS	2.35	9.40
951	CT	11005011	LASSO RED SEEDS	892.23	48,510.73
46	DZ	11005014	SCARLET NANTES SEEDS	5.90	271.40
100	EA	31321655	SEMILLAS DEL SUS SOMBEROS	24.95	2,495.00

Thank You . . . . .
Because almost half of
your order was Lasso Red
Seeds, you will receive
a 10% discount on your
next order.

Total Due $99,630.14

Return this tear-off strip with your payment.   Make Checks Payable to: Super Sun Seeds
Payment is due by: 8/28/02   Amount Due is: $99,630.14

   LOS ARBOLES DEL MUNDO
   32483 ARBOL LANE
   MESA VERDE
   IL 65478-9390

0001410099630146

Bar Code

Figure 41. Bar Codes Printed on an IPDS Printer

Making a Bar Code Decision

Before deciding which bar code you want to use, there are several things you should ask yourself. The information to help you decide the answers are presented in the following sections.

Which Symbology?

This decision is sometimes the easiest to make because the industry or application may dictate which symbology must be used. The retail industry, for example, uses UPC or Code 128.

If you can make your own symbology decision, factors such as character set (do you have numeric only or alphanumeric data to encode), density, and space available on the printed document must be considered.

What Density?

The bar code density is determined by the width of the bars and spaces. The narrower the bars and spaces, the higher the density. You must consider these factors before deciding which density to use: How much space is available for the bar code? Will the bar code be read by a hand-held scanner used close to the bar code or will it be read at a distance? Bar codes read from a distance require a lower density bar code with wider bars.

What density is the printer capable of printing? Impact printers tend to print lower density bar codes than laser printers. Do you have enough space on the document for the density of the bar code the printer is capable of printing? Is there a sufficient quiet zone?

Will your scanner be able to reliably read the bar code density? Most scanners scan with either a small, medium or large scanning dot radius. If your scanner has a large scanning dot and the bar code has a high density or vice-versa, the bar code might not scan reliably.

What Height?

Will the bar code be read by a hand-held wand? If it will, the aspect ratio might need to be changed to produce a bar code with taller bars.

Using picket fence orientation as an example, it is more difficult to scan a long, short bar code with a wand than with a laser gun. How much space is available? Do bearer bars have to be included in the height?

What Orientation?

What space on the document is available? Does available space dictate bar code orientation? If the bar code is being mechanically scanned, is there a requirement for a specific orientation? Is there more than one bar code on the label or document and should each bar code be in a different orientation to simplify scanning?

Laser printers sometimes experience a quality reduction called *keystoning*. Keystoning is a condition where the leading or trailing edge of a character (relative to the movement of the paper through the printer) tends to fade away and does not have a sharp boundary. This is usually noticeable on the bottom edge of a line of text or a bar.

If the bar code is printed with the picket fence orientation, keystoning makes little difference because the loss of quality is at the top or bottom of the bars and it will have minimal affect on scanning the bar code.

If the bar code is printed with the ladder orientation, then the keystoning can affect the leading or trailing edge of each bar and cause first read rate problems.

What Print Volume?

How many bar codes must be printed? Do you need to print them multiple-up? How does this affect printer performance?

What Print Window?

How much time is available for bar code printing? Can the bar codes be printed batch or must they be printed on demand? Are multiple printers necessary for small print windows or for backup requirements?

Specifying Bar Codes with DDS

This example shows the printer file DDS (BARSMP) source that produced the samples in this chapter. It also generates bar codes not pictured here. Creating bar codes is relatively easy, you only need to specify the application field, the BARCODE keyword, and the type of bar code desired.

```
5722WDS V5R2M0  020719                SEU SOURCE LISTING            07/17/02 22:46:07   1
SOURCE FILE . . . . . . .  FVT/QDDSSRC
MEMBER  . . . . . . . . .  BARFVT
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
  100     A*BAR CODES USING DDS ON THE AS/400
  200     A           R TITLE                LPI(8)
  300     A  11         TLE1         50      18SKIPB(4)
  400     A                                  SPACEA(4)
  500       *
  600     A           R BARCDE               LPI(8)
  700     A N24        HEAD2        30       48
  800     A            HEAD1        30        9
  900     A                                  SPACEA(1)
 1000     A  12         CD12@1       11S     11BARCODE(UPCA 4)
 1100     A  12         CD12@2       12S     50BARCODE(EAN13 4)
 1200     A  12                              SPACEA(9)
 1300       *
 1400     A  13         CD13@1       10S     11BARCODE(INTERL2OF5 4)
 1500     A  13         CD13@2       10S     50BARCODE(MATRIX2OF5 4)
 1600     A  13                              SPACEA(9)
 1700       *
 1800     A  14N24      CD14@2       10A     50BARCODE(CODEABAR 4)
 1900     A  14         CD14@1       10S     11BARCODE(INDUST2OF5 4)
 2000     A  14                              SPACEA(9)
 2100       *
 2200     A  15         CD15@1       11A     11BARCODE(CODE3OF9 4)
 2300     A  15         CD15@2       10S     50BARCODE(MSI 4)
 2400     A  15                              SPACEA(9)
 2500       *
 2600     A  16         CD16@1       11A     11BARCODE(CODE128 4)
 2700     A  16         CD16@2        8A     66BARCODE(CODE128 9 *VRT  +
 2800     A                                   (*WIDTH .03))
 2900     A  16                              SPACEA(10)
 3000       *
 3100     A  17         CD17@1        5S     11BARCODE(POSTNET)
 3200     A  17                              SPACEA(4)
 3300     A  18         CD18@1        9S     11BARCODE(POSTNET)
 3400     A  18                              SPACEA(4)
 3500     A  19         CD19@1       11S     11BARCODE(POSTNET)
 3600       *
 3700     A  20         PDF417       50A     11BARCODE(PDF417 (.12 *UOM) +
 3800     A                                   (*PDF417 10 20 1 *NOESCAPE))
 3900     A  20                              SPACEA(25)
 4000       *
 4100     A  22         MAXI         50A     50BARCODE(MAXICODE 1 +
 4200     A                                   (*MAXICODE 4 *ZIPPER))
 4300     A* 22                              SPACEA(10)
 4400       *
 4500     A  22         MATRIX       50A     11BARCODE(DATAMATRIX 1  +
 4600     A                                   (*DATAMATRIX 20 20  +
 4700     A                                   *USRDEF *DATA *NO))
                        * * * *  E N D   O F   S O U R C E  * * * *
```

Specifying Bar Codes in Infoprint Designer

You can specify bar codes with Infoprint Designer while you design your layout.
Follow these steps to specify a bar code:

1. From the project window, click the bar code tool on the toolbar. The bar code
   tool is circled in Figure 42 on page 117.
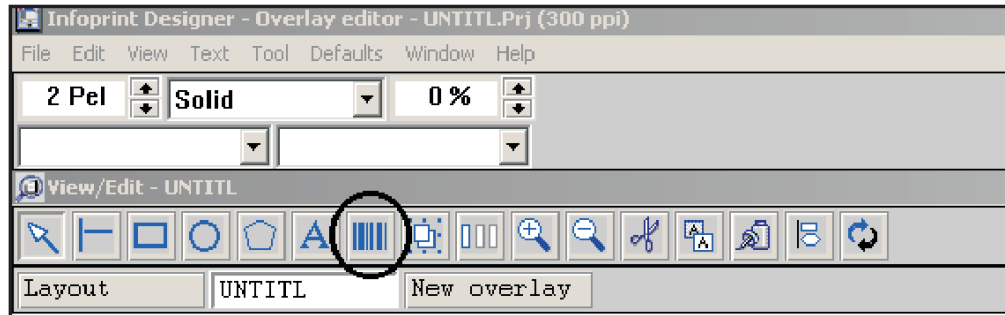
Figure 42. The Bar Code Tool Button

2. The **Bar code type definition** window opens, shown in Figure 43. Use the pages on this window to specify the bar code's name, type, modifier, HRI font (if you want HRI), color, and size. Click **OK**. This defines a new bar code for the layout.
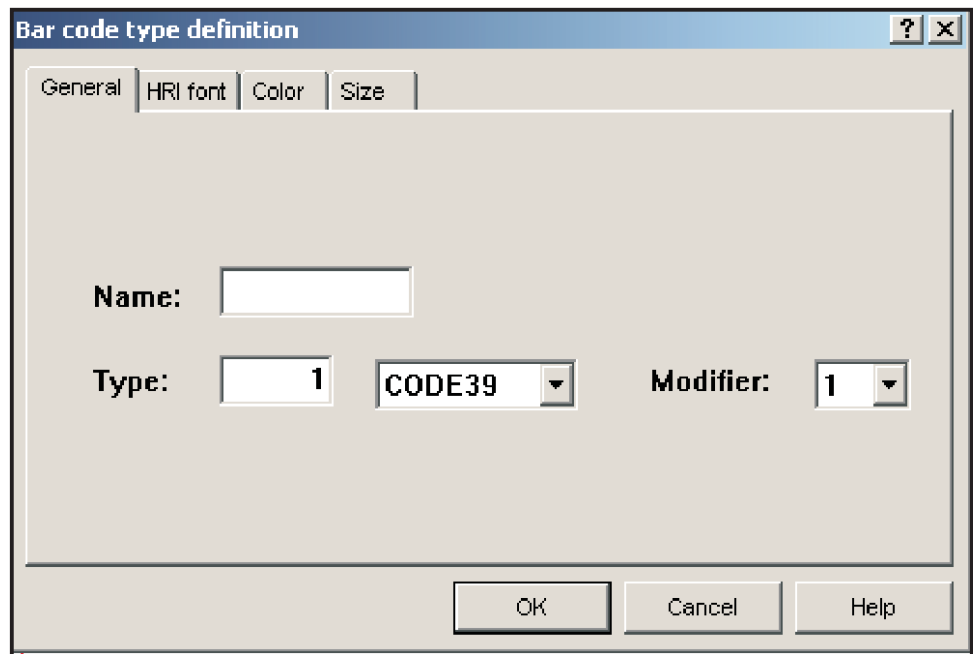
Figure 43. Defining the Bar Code

3. The **Bar code field properties** window opens, shown in Figure 44 on page 118. Use the pages on this window to specify the properties for this field. You can specify the string to encode (1234567 is specified in Figure 44), whether you want HRI and where you want it placed, and the bar code's orientation. Click **OK**.
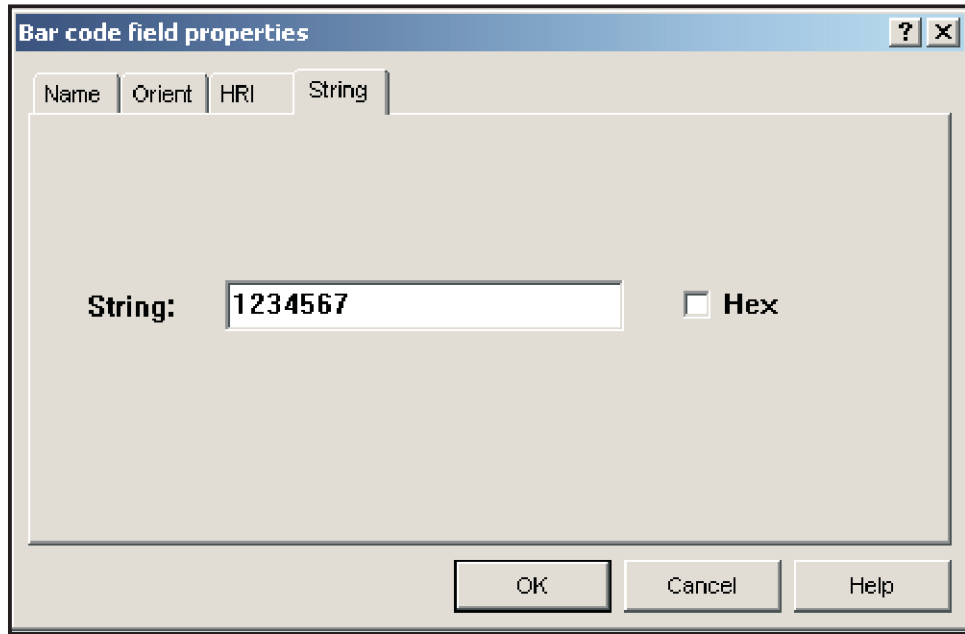
Figure 44. Specifying the Bar Code Properties

4. The bar code is placed on the layout.

Specifying Bar Codes in Print Format Utility

The Print Format Utility of the IBM AFP Utilities can be used to print bar codes. You can specify bar codes when you format data with the Print Format Utility. Bar codes supported by AFP Utilities are the same as those supported by DDS.

Use the Change Bar Code Detail panels to specify bar codes Print Format Utility.

```
                          Change Bar Code Detail
 Mark:    *C003            Measurement method:    Inch
 Type choices, press Enter.
   Position:
     Across . . . . . . . . . .   1.40        0.00-22.75
     Down . . . . . . . . . . .    .66        0.00-22.75
   Bar code type  . . . . . . .   9           1=CODE3OF9, 2=MSI, 3=UPC-A
                                              4=UPC-E, 5=EAN-8, 6=EAN-13
                                              7=INDUST25, 8=MATRIX25
                                              9=INTERL25, 10=CODABAR
                                              11=CODE128, 12=POSTNET
                                              13=ROYAL MAIL, 14=JPBC
                                              15=AUSTRALIA POST
   Bar code data  . . . . . . . &ITM1.
                                              F4 for list
   Element  . . . . . . . . . .                Name
                                                                      More...
 F3=Exit   F4=Prompt   F5=Refresh   F6=Change measurement method   F12=Cancel
```

Figure 45. Change Bar Code Detail Display

```
                     Change Bar Code Detail
 Mark:   *C003              Measurement method:   Inch
 Type choices, press Enter.
   Degree of rotation . . . . .  0           0, 90, 180, 270
   Color  . . . . . . . . . . .  *DEFAULT    *DEFAULT, 1=Blue, 2=Red
                                             3=Magenta, 4=Green, 5=Cyan
                                             6=Yellow, 7=Brown, 8=Black
   Check digit  . . . . . . . .  N           Y=Yes, N=No
   HRI  . . . . . . . . . . . .  3           1=Below, 2=Above, 3=No
   HRI font . . . . . . . . . .  *DEFAULT    *DEFAULT, 1-8, F4 for list
   Module width . . . . . . . .  *DEFAULT    *DEFAULT, 0.001-0.254
   Element height . . . . . . .  *DEFAULT    *DEFAULT, 0.01-22.75
   Wide to narrow ratio . . . .  *DEFAULT    *DEFAULT, 2.00-3.00
                                                                 Bottom
 F3=Exit   F4=Prompt   F5=Refresh   F6=Change measurement method   F12=Cancel
```

Figure 46. Change Bar Code Detail Display

Usually, you specify the positioning. Optionally, you can specify changes to the bar code characteristics, such as height, width factors, and whether human-readable information (HRI) is printed above or below the bar code.

If bar codes are required in an AFP Utilities application, but the target printer does not support the IPDS bar code object, AFP Utilities generates draw rule bar codes that do not require BCOCA support. AFP Utilities makes the draw rule decision based on the printer type selected in the form specification. Bar codes can also be printed as fonts with bar code fields in form layouts as font changes rather than bar code elements.

Print Format Utility bar codes can be either fixed or variable (dynamic). Variable bar codes can change with each record, producing a unique bar code for each form.

Chapter 12. Working with Object Containers

Object containers are used to carry non-OCA objects, such as GIF and TIFF images, in an AFP data stream. There are different ways to include them in your data, depending on your installation and how you want to use them.

The DDS keyword AFPRES lets you reference a print resource stored in the integrated file system, including an object container.

Object containers can be mapped using the MO:DCA Map Data Resource (MDR) structured field. Mapping causes PSF for iSeries to send the object container to the printer to be used multiple times, just like it does fonts, overlays and page segments. If you want them downloaded once to the printer and used repeatedly on subsequent pages or overlays, they should be included as *data object resources*. Data object resources are those object containers (or IOCA objects) that are sent to the printer in the IPDS home state. Object containers sent to the printer in this state are saved as data object resources to be used later while processing a page or overlay.

You can specify at most 10 object containers per page of data. When using object containers, you must ensure that the device to which you send the data supports the type of object included. Also, the i5/OS searches for object containers differently than other objects. The search method is described in the documentation of the DDS AFPRSC keyword on the iSeries Information Center.

Part 2. Super Sun Seeds Case Study

In this part, various tools that can be used to produce the Super Sun Seeds invoice as an electronic output application are introduced. Each chapter describes how to use a specific tool, then shows how to use the tool to work with the Super Sun Seeds case study. The part contains these chapters:

for additional guidance about which document tool would be best for your environment or application.

Chapter 13. Introduction to the Super Sun Seeds Case Study

Much of this document is devoted to describing how to move to electronic output, using AFP. Because there are many approaches to building AFP applications, a single case study, the Super Sun Seeds invoicing application, is used throughout.

Super Sun Seeds currently uses preprinted, multipart invoice forms, and produces the invoice document shown in .

Figure 47. Super Sun Seeds Preprinted Invoice

INVPRE Application Program Example

The application program producing the Super Sun Seeds invoice data is INVPRE, shown in this example.

```
5722WDS V5R2M0                        SEU SOURCE LISTING      10/10/02 17:47:39      1
SOURCE FILE . . . . . . .   SAMPLER/QRPGSRC
MEMBER  . . . . . . . . .   INVPRE
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
  100      * INVPRE - Super Sun Seeds - Sample of a Preprinted Invoice
  200      *
```

```
  300      *   This program reads a transaction file (SEEDDETL), retrieves info
  400      *   from item master (SEEDITEM) and customer master (SEEDCUST), then
  500      *   prints invoices.
  600      *
  700      *   Invoice detail lines are processed until either end of customer order
  800      *   or lines=25, at which time the invoice page is printed.  At end of
  900      *   order, a check is made to see if there are more than 18 detail lines
 1000      *   to print.  If there are, that would not leave room in the invoice body
 1100      *   to print the customer offer.  In this case, the page is printed, and a
 1200      *   new  final page is built with the offer and the payment coupon.
 1300      *
 1400      *   The offer is a message based on item sales in the customer master.
 1500      *
 1600      *
 1700     FSEEDDETLIP E           K        DISK
 1800     FSEEDITEMIF E           K        DISK
 1900     FSEEDCUSTIF E           K        DISK
 2000     FINVPRE  O  E                    PRINTER
 2100      *
 2200     E                 WDS     1 40 24            Text for Offer
 2300      *
 2400     IINVCDETL   01
 2500     I                                     STNAME          32
 2600     I                                     CUST# L1
 2700     ICUSTDATA   02
 2800     IITEMDATA   03
 2900      *
 3000     IBARTOT     DS
 3100     I                                  1   60CUST#
 3200     I                                  7  152TOTDUE
 3300      *
 3400     IPAYDAA     DS
 3500     I                                  1   20PAYMO
 3600     I                                  3   40PAYDA
 3700     I                                  5   60PAYYR
 3800      *
 3900     C          *IN90    IFEQ '0'                 First Pass Only
 4000     C                   SETON                90
 4100     C                   EXSR DATESR
 4200     C                   ENDIF
 4300      *
 4400      * Start of customer order
 4500      *
 4600     C          *INL1    IFEQ '1'                 Start Customer
 4700     C          CUST#    ADD  31200    INVC#  60   Invent Invoice#
 4800     C                   Z-ADD0        TOTDUE 92   Reset Totals/Ctrs
 4900     C                   Z-ADD0        ITMCNT 30
 5000     C                   Z-ADD0        PAGCNT 30
 5100     C          CUST#    CHAINSEEDCUST        20
 5200     C   32              MOVEL'   SAME'STNAME
 5300     C                   Z-ADDZIP      ZIPPN  90
 5400     C*
 5500     C                   WRITEINVTOP
 5600     C*
 5700     C                   ENDIF
 5800     C*
 5900     C* Detail Processing
 6000     C*
 6100     C          *IN01    CABNE'1'      ENDDET      Item Processing
 6200     C                   ADD  1        ITMCNT
 6300     C          ITM1     CHAINSEEDITEM        21
 6400     C*
 6500     C          QTY1     MULT SELPRC   EXTPRC 72
 6600     C                   Z-ADDQTY1     QTY    40
 6700     C          EXTPRC   ADD  TOTDUE   TOTDUE
 6800     C*
 6900     C                   WRITEDETLIN               Write Detail Line
```

```
7000        C*
7100         * Check for end of space on page
7200         *
7300        C            ITMCNT    IFEQ 25                         Full 1st Page
7400        C                      ADD  1     PAGCNT
7500        C                      SETON                     31
7600        C                      WRITEPAGEOF                     Pg 1 of 2 Msg
7700        C                      WRITEINVTOP                     Invoice Heading
7800        C                      SETOF                     31
7900        C                      Z-ADD0     ITMCNT
8000        C                      ENDIF
8100        C*
8200        C            ENDDET    TAG
8300        C*
8400        C* End of customer order
8500        C*
8600        CL1          ITMCNT    IFGT 18                         No Room for Offer
8700        CL1                    ADD  1     PAGCNT
8800        CL1                    SETON                     31
8900        CL1                    WRITEPAGEOF                     Pg 1 of n
9000        CL1                    WRITEINVTOP                     Invoice Heading
9100        CL1                    SETOF                     31
9200        CL1                    ENDIF
9300        C*
9400        C* Payment coupon fields
9500        C*
9600        CL1                    MOVE BARTOT  BARPRC 150     Load Totals
9700        CL1                    Z-ADDTOTDUE  TOTD@2  92
9800        CL1                    MOVE NAME    NAME@2 25
9900        CL1                    MOVE STREET  STRE@2 25
10000       CL1                    MOVE CITY    CITY@2 25
10100       CL1                    MOVE STATE   STAT@2  2
10200       CL1                    MOVE ZIP     ZIP@2   9
10300       CL1                    ADD  1     PAGCNT
10400       C*
10500       C* Write Offer
10600       C*
10700       CL1                    EXSR OFFSR
10800       CL1 30                 WRITEOFFER                      Write Offer and
10900       CL1                    WRITEINVBOT                     Invoice Totals
11000       CL1                    SETOF                     30
11100       C*
11200       C* Set up Date
11300       C*
11400       CSR          DATESR    BEGSR
11500       CSR                    Z-ADDUDAY   PAYDA
11600       CSR          UMONTH    ADD  1     PAYMO
11700       CSR          PAYMO     IFGT 12
11800       CSR                    Z-ADD1     PAYMO
11900       CSR          UYEAR     ADD  1     PAYYR
12000       CSR                    ELSE
12100       CSR                    Z-ADDUYEAR  PAYYR
12200       CSR                    ENDIF
12300       CSR                    MOVE PAYDAA  PAYDAT 60
12400       CSR                    Z-ADDPAYDAT  PAYDA@ 60
12500       CSR                    ENDSR
12600        *
12700        * Set up Special Offer
12800        *
12900       CSR          OFFSR     BEGSR
13000       CSR          SLSSED    IFGE 500                        Seeds
13100       CSR                    Z-ADD1     IX      20
13200       CSR                    SETON                     30
13300       CSR                    GOTO WRTOFR
13400       CSR                    ENDIF
13500       CSR          SLSFRT    IFGE 500
13600       CSR                    Z-ADD7     IX              Fruit
```

```
13700      CSR                  SETON                    30
13800      CSR                  GOTO WRTOFR
13900      CSR                  ENDIF
14000      CSR       SLSSUP     IFGE 500                      Trees
14100      CSR                  Z-ADD13      IX
14200      CSR                  SETON                    30
14300      CSR                  GOTO WRTOFR
14400      CSR                  ENDIF
14500      CSR       SLSCHM     IFGE 500                      Stuff
14600      CSR                  Z-ADD19      IX
14700      CSR                  SETON                    30
14800      CSR                  GOTO WRTOFR
14900      CSR                  ENDIF
15000      C*
15100      CSR                  GOTO ENDOFR
15200      C*
15300      CSR       WRTOFR     TAG
15400      CSR                  MOVE WDS,IX  OFFR@1 24     Build Offer Text
15500      CSR                  ADD  1       IX
15600      CSR                  MOVE WDS,IX  OFFR@2 24
15700      CSR                  ADD  1       IX
15800      CSR                  MOVE WDS,IX  OFFR@3 24
15900      CSR                  ADD  1       IX
16000      CSR                  MOVE WDS,IX  OFFR@4 24
16100      CSR                  ADD  1       IX
16200      CSR                  MOVE WDS,IX  OFFR@5 24
16300      CSR                  ADD  1       IX
16400      CSR                  MOVE WDS,IX  OFFR@6 24
16500      CSR       ENDOFR     ENDSR
16600      C*
16700         *
16800 **  WDS    WORDS FOR OFFER
16900 Thank You .....
17000 Because you have ordered
17100 over $500 of seeds this
17200 year, on your next seed
17300 order you will receive
17400 a 10% discount.
17500 Thank You .....
17600 Because you have ordered
17700 over $500 of fruit this
17800 year, on your next fruit
17900 order you will receive
18000 a 10% discount.
18100 Thank You .....
18200 Because you have ordered
18300 over $500 of trees this
18400 year, on your next tree
18500 order you will receive
18600 a 10% discount.
18700 Thank You .....
18800 Because you have ordered
18900 over $500 of stuff this
19000 year, on your next stuff
19100 order you will receive
19200 a 10% discount.
19300
                    * * * * E N D   O F   S O U R C E   * * * *
```

INVPRE Application Program General Processing Flow

The general processing flow for the source program above (INVPRE) is as follows:

1. Customer order (file SEEDDETL) is processed.

2. At the beginning of each customer order, customer information is retrieved from the customer master (file SEEDCUST). This provides the bill to and ship to information for the top half of the invoice page.

3. For each line item, item master information is retrieved from the item master (file SEEDITEM).

4. Line extensions are calculated, and order totals are accumulated.

5. An invoice detail line is printed. The preprinted invoice accommodates up to 25 line items per page.

6. If a customer order contains more than 25 line items, the message *Continued* is printed in the total box, and the invoice is continued on the next form.

7. At the end of a customer invoice, an optional sales offer might be printed, based on that customer's sales history.

8. The invoice total is printed at the bottom of the page in the form of a payment coupon.

DDS referenced in the INVPRE printer file formats and positions the output external to the application program, using DDS in the.

DDS Source for INVPRE Example

This is the DDS printer file source for the INVPRE DDS application:

```
5722WDS V5R2M0                          SEU SOURCE LISTING      10/10/02 17:47:39      1
SOURCE FILE . . . . . . .  SAMPLER/QDDSSRC
MEMBER  . . . . . . . . .  INVPRE
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
  100      A*  INVPRE: Sample of standard invoicing output used with
  200      A*        preprinted forms.
  300      A*
  400      A*   Printer File Create or Change Parameters:
  500      A*   - Printer Device Type (DEVTYPE)      *SCS
  600      A*   - Overflow Line (OVRFLW)             64
  700      A*   - Front Overlay (FRONTOVL)           INVALL
  800      A*
  900      A* Page 1 Header
 1000      A*- includes Postnet Zip+4
 1100      A*
 1200      A          R INVTOP                  SKIPB(12)
 1300      A            NAME          25A       12
 1400      A            STNAME        25A       48
 1500      A                                    SPACEA(1)
 1600      A            STREET        25A       12
 1700      A            STSTRT        25A       48
 1800      A                                    SPACEA(1)
 1900      A            CITY          25A       12
 2000      A            STCITY        25A       48
 2100      A                                    SPACEA(1)
 2200      A            STATE          2A       12
 2300      A            ZIP            9S       16 EDTWRD('    -    ')
 2400      A            STSTE          2A       48
 2500      A            STZIP          9S       52 EDTWRD('    -    ')
 2600      A                                    SPACEA(3)
 2700      A            CUST#          6S 0     14 EDTCDE(Z)
 2800      A            INVC#          6S 0     32 EDTCDE(Z)
 2900      A                                    49DATE EDTCDE(Y)
 3000      A            PAYDAT         6S 0     66EDTCDE(Y)
 3100      A                                    SPACEA(2)
 3200      A            SHPVIA        10A       14
 3300      A                                    34DATE EDTCDE(Y)
 3400      A            TERMS         10A       47
 3500      A            SLSMAN        16A       64
 3600      A                                    SPACEA(4)
```

```
3700    A*
3800    A* Detail Lines
3900    A*
4000    A           R DETLIN
4100    A             QTY         4S 0     8 EDTCDE(Z)
4200    A             UOM         2A      13
4300    A             ITEM#       8S 0    18
4400    A             ITMDES     25A      28
4500    A             SELPRC      6S 2    58 EDTCDE(J)
4600    A             EXTPRC      7S 2    70 EDTCDE(J)
4700    A                                   SPACEA(1)
4800    A*
4900    A* Multipage Message
5000    A*
5100    A           R PAGEOF                SKIPB(51)
5200    A                                 70'Continued'
5300    A             PAGCNT      3S 0    73 EDTCDE(Z)
5400    A                                   SKIPB(63)
5500    A                                 65'Page'
5600    A*
5700    A* Invoice Totals
5800    A*
5900    A           R INVBOT                SKIPB(51)
6000    A             TOTDUE      9S 2    67 EDTWRD('  ,    , $0.  -')
6100    A                                   SPACEA(4)
6200    A             PAYDA@      6S 0    25 EDTCDE(Y)
6300    A             TOTD@2      9S 2    67 EDTWRD('  ,    , $0.  -')
6400    A                                   SPACEA(2)
6500    A             NAME@2     25A      12
6600    A                                   SPACEA(1)
6700    A             STRE@2     25A      12
6800    A                                   SPACEA(1)
6900    A             CITY@2     25A      12
7000    A                                   SPACEA(1)
7100    A             STAT@2      2A      12
7200    A             ZIP@2       9A      16
7300    A             PAGCNT      3S 0    73 EDTCDE(Z)
7400    A                                   SKIPB(63)
7500    A                                 65'Page'
7600    A*
7700    A* Offer Print
7800    A* - Font 92 is Courier Italic 12-pitch
7900    A*
8000    A           R OFFER                 SKIPB(43)
8100    A*                                  FONT(92)
8200    A             OFFR@1     24A      33
8300    A                                   SPACEA(1)
8400    A             OFFR@2     24A      33
8500    A                                   SPACEA(1)
8600    A             OFFR@3     24A      33
8700    A                                   SPACEA(1)
8800    A             OFFR@4     24A      33
8900    A                                   SPACEA(1)
9000    A             OFFR@5     24A      33
9100    A                                   SPACEA(1)
9200    A             OFFR@6     24A      33
9300    A                                   SPACEA(1)
              * * * *  E N D  O F  S O U R C E  * * * *
```

Choosing the Proper Tool

Moving the Super Sun Seeds invoice to an electronic invoice involves choosing from a number of application enabling tools. That choice is influenced by at least three factors: (1) the application requirements of the new invoice, (2) the characteristics of the current application, and (3) the skills available or required.

See Chapter 23, "Deciding on an Output Strategy and Set of Tools," on page 247 for more help deciding which product is best for you.

First, the new invoicing application might require:
- Changes in overall page layout.
- Static or dynamic layout.
- Single or multiformat pages.
- Bar codes, images, and other document elements.
- Specification of how copies are handled.
- Certain processing or performance characteristics.

Second, certain characteristics of the existing invoicing application, primarily access to source code, is a factor.

Finally, skill requirements or preferences are a factor:
- Availability of programming skills.
- Scope of electronic printing applications, for example, the number of applications and electronic forms.

All of these approaches create an electronic Super Sun Seeds document (Print Format Utility is better suited to a related application, such as creating shipping labels):

Printer file parameters provide you with an easy, automatic way to change to your output. For information about using printer files, see Chapter 14, "Using Printer Files," on page 133.

DDS (Data Description Specifications) is the standard interface to the output page. DDS keywords provide complete and dynamic control of all page elements. DDS is integrated with the application program, enabling page content to be customized by application data and program logic. For information about using DDS, see Chapter 15, "Using Data Description Specifications," on page 137.

Infoprint Designer lets you seamlessly download spooled files that you have retained from an application run and display them in the Layout Editor for drag-and-drop placement on your overlay. Infoprint Designer's Layout Editor also allows variable page-to-page formatting, such as 'spot carbon' and 'multiple-up' applications. For more advanced output, you still use the Layout Editor, but you approach the output with a logical sequence of what goes where and when. For information about using Infoprint Designer, see Chapter 16, "Using Infoprint Designer," on page 165.

Page definitions and form definitions provide application-independent document formatting. These definitions, created with **Infoprint Designer** or other document applications, are referenced by the printer file. This dynamically transforms existing line-mode output to complex electronic documents.

Print Format Utility (PFU) creates electronic output directly from iSeries database files, using an interactive user interface. PFU is well suited to quick turnaround applications and multi-up documents (such as bar coded labels). For information about using PFU, see Chapter 17, "Using the Print Format Utility," on page 185.

Chapter 14. Using Printer Files

As described in Chapter 4, "Introduction to Printer Files," on page 25, every i5/OS job has a printer file that provides page defaults such as margins, line spacing, and overflow. The printer file also provides printer and output queue options such as printer device, file type, and whether the spooled file is saved. It lets you specify page composition objects, such as front and back overlays and page definitions and form definitions.

One of the simplest ways to create fully graphical documents is to add an overlay to an application with a printer file. This technique instantly transforms a preprinted form application into a completely electronic application. Using printer file overlays does not provide you with as many functions as those done with DDS or with page definitions and form definitions, but for many output applications, this method is adequate.

Figure 3 on page 13 shows the Super Sun Seeds sample case study invoice application. The existing application program, whether data fields are program-described or externally-described, only places lines of output in the spooled file. The document is completed by printing those lines on a fixed, preprinted form.

Specifying an overlay in the printer file eliminates the need for pre-printed forms. To add an overlay, modify the printer file overlay and positioning parameters with the Create Printer File (CRTPRTF), Change Printer File (CHGPRTF), or Override Printer File (OVRPRTF) commands. These are the key parameters to use when adding an overlay, shown in bold in Figure 48 on page 134 :

```
                    Create Printer File (CRTPRTF)

 Type choices, press Enter.

 AFP Characters . . . . . . . . .    *NONE          Character value, *NONE
              + for more values
 Degree of page rotation  . . . .    *AUTO          *AUTO, *DEVD, *COR, 0, 90...
 Pages per side . . . . . . . . .    1              1-4
 Reduce output  . . . . . . . . .    *TEXT          *TEXT, *NONE
 Print text . . . . . . . . . .      *JOB
 Hardware justification . . . . .    0              0, 50, 100
 Print on both sides  . . . . . .    *NO            *NO, *YES, *TUMBLE, *FORMDF
 Unit of measure  . . . . . . . .    *INCH          *INCH, *CM
 Front side overlay:
   Overlay  . . . . . . . . . . .    *NONE          Name, *NONE
     Library  . . . . . . . . . .                   Name, *LIBL, *CURLIB
   Offset down  . . . . . . . . .                   0-57.790
   Offset across  . . . . . . . .                   0-57.790

                                                                  More...
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

```
                    Create Printer File (CRTPRTF)

 Type choices, press Enter.

 Back side overlay:
   Overlay  . . . . . . . . . . .    *FRONTOVL      Name, *FRONTOVL, *NONE
     Library  . . . . . . . . . .                   Name, *LIBL, *CURLIB
   Offset down  . . . . . . . . .                   0-57.790
   Offset across  . . . . . . . .                   0-57.790
   Constant back  . . . . . . . .                   *NOCONSTANT, *CONSTANT
 Convert line data  . . . . . . .    *NO            *NO, *YES
 IPDS pass through  . . . . . . .    *DEVD          *DEVD, *NO, *YES
 User resource library list . . .    *DEVD          Name, *DEVD, *NONE...
              + for more values
 Corner staple  . . . . . . . . .    *NONE          *NONE, *BOTRIGHT...




                                                                  More...
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 48. Create Printer File - Adding an Overlay

Printer device type
Since overlays are AFPDS objects, Printer device type must specify *AFPDS.

Unit of Measure
Specify whether measurements are given in inches or centimeters.

Front side overlay
Specify an overlay to put on the front side of every page. You can specify its offset from the page origin.

Back side overlay
Specify an overlay to put on the back side of every page. You can specify its offset from the page origin. You can also specify whether the Constant back option is used. For a duplex job, this lets you print an overlay on the back of each page in the spooled file without manually adding blank pages for the back overlay to be printed on.

Front side margin
> Specify the margins to use for the front of every page. You can specify the down and across values or use the values in the device description.

Back side margin
> Specify the margins to use for the back of every page. You can specify the down and across values or use the values in the device description.

Usually, you specify the overlay object name for the front overlay parameter and use zero for the offsets. If the new invoice overlay and the invoice data do not line up, you can use the overlay offsets and margins to fine-tune the positioning. Note that in this case, the margin parameters move all page elements – the application data and the overlay. Therefore, It is usually best to use the overlay offset to correctly position the electronic form with respect to the data. Any offsets you use, overlay or margin, work in the units (inches or centimeters) defined by the Unit of measure parameter.

Additional Considerations

Using printer file overlay support to transform the Super Sun Seeds sample application is easy and quick, and it requires no change to the application program. In fact, you can make this change after the application has already run and created the spooled file. You use the Change Spooled File Attributes (CHGSPLFA) command and the parameters described above. The limitation of this approach is that you have cannot address more complex documents or reformat the application data.

Duplexing and multiple copies are often built into preprinted forms. The continuous form has multiple copies and might have some fixed text on the back of one or all of the copies. With printer file overlay support, you can create multiple copies by printing the spooled file multiple times and overriding it each time with a different overlay name; that is, by specifying invoice overlays that differ only in that they say "Customer Copy", "Packing List", and so forth at the bottom of the form.

This process can be automated with a CL program. Using this technique, you would produce uncollated copies of the invoices, which means that all the customer copies are in one stack, all the packing lists are in another, and so on. If one or more of the copies needs to be grouped together for your invoicing function; that is, collated, then one of the other application enabling techniques covered in the following chapters is more appropriate.

Placing constant text on the back side of the invoice can be done with back overlay support, but requires an application change. Constant text usually consists of terms and conditions information. If you have specified DUPLEX(*YES) and you specified both front and back overlays, then the invoice data will print on both sides. This means that the back side prints with the right overlay and with unwanted application data. The cause of the problem is that there is no page eject to move that page of invoice data to the front of the next page. A simple change to the application program can add a page eject after each page of invoice data is printed.

There are some limitations to this approach, specifically as they relate to a preprinted invoicing application. You cannot specify these with a printer file:
- Multiple overlays, either per page or over groups of pages
- Images, graphics, or bar codes

- Integrated application logic

The above functions can only be specified with the more advanced printing techniques covered in subsequent chapters. These elements all require you to take some action based on the content of the program data. For example, you might want to use a different overlay based on the company number in the invoice data, print an output field in bar code, or print an image based on customer information. These functions are beyond the scope of the overlay support in the printer file.

Chapter 15. Using Data Description Specifications

Data Description Specifications (DDS) is included in i5/OS. Using it for application output gives you access to the advanced printing capabilities of i5/OS in much the same way as using external database files gives access to the advanced database capabilities of the i5/OS. DDS printer file support provides full control of each page and all the elements that come together on a page, such as overlays, images, bar codes, lines, and boxes. For example, with DDS you can control what overlays or images go on what pages. DDS also supports the advanced printing capabilities of today's printers, such as finishing.

Nearly all DDS support is dynamic; that is, the application controls both the element and its positioning at run time.

As described in Chapter 4, "Introduction to Printer Files," on page 25, every i5/OS job has a printer file that provides page defaults such as margins, line spacing, and overflow. The printer file also provides printer and output queue options such as printer device, file type, and whether the spooled file is saved. It lets you specify page composition objects, such as front and back overlays and page definitions and form definitions. Generally, these parameters apply to the entire job or spooled file. DDS works with the printer file to format and define application output.

Printer File DDS

DDS printer file support externalizes application output formatting and extends it to full-page applications. Output that is defined in the program is called program-described output. Output that is defined with DDS is called externally-described output.

Figure 49 on page 138 shows a simple example of how DDS is used in the printer file to define application output. The application program prepares the variable data. It also establishes the logic of printing, or in this case, the "writes" to DDS records. DDS groups one or more individual fields together to create a record. A DDS print record is the collection of fields and print keywords that are to be run when the application program issues the write command. The application program controls output by specifying when to write which records.

The data fields are referenced in the record format. The printer file specifies the DDS to use on the Source file (SRCFILE) parameter. Through DDS keywords, the printer file controls the position, orientation, font, and other characteristics for those fields. In addition, DDS provides access to all the elements—text, overlays, images, graphics, bar codes, lines, and boxes—that comprise AFP documents.

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Application Program
Do some calcs
Write CUSTREC

Output:
Chris Smith
812 North Street
<u>Boulder</u>

‖‖‖‖‖

Printer File DDS

```
A   R CUSTREC         FONT(11)
A     NAME      6 10 HIGHLIGHT
A     ADDRESS   7 10
A     CITY      8 10 UNDERLINE
A     CUSTNO   10 25 BARCODE(3OF9)
```
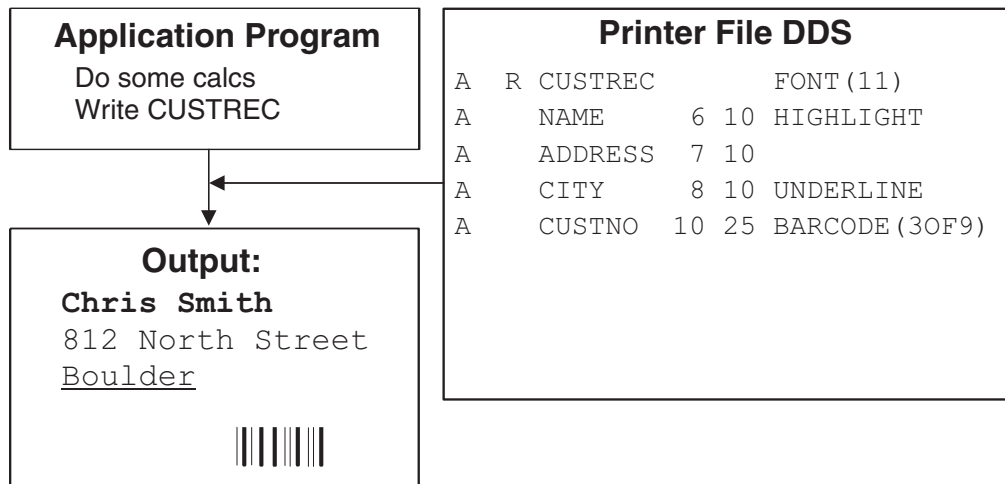
Figure 49. Externally Described Printer File with DDS

Keywords for AFP Applications

The keywords described in this section are used with applications that use full page mode. Keywords for page layout, page composition, and finishing are listed. For a description of all DDS keywords used in printer files, refer to *DDS Reference: Printer Files* in the iSeries Information Center.

Table 13. DDS Keywords for AFP Applications

Page layout keywords: record-level keywords unless otherwise specified	
Keyword	**Description**
DOCIDXTAG (Document Index Tag)	Creates indexing tags in the document for use by presentation systems such as the AFP Viewer and OnDemand. You specify Attribute-name (such as 'Policy Number'), Attribute -value (such as '43127'), and Tag Level (Group or Page).
DRAWER (Drawer)	Specifies the drawer from which noncontinuous forms are selected.
DTASTMCMD (Data Stream Command)	Use this record- or field-level keyword to store a data stream command or some other piece of information in a spooled file. You can use this command to determine how to process a record or field on a particular page of the spooled file.
DUPLEX (Duplex)	Specifies whether output is printed on one or on two sides of the paper.
ENDPAGE (End Page)	Ejects the current page after the current output record is printed.
ENDPAGGRP (End Page Group)	Ends a logical group of pages. The Infoprint Server PDF subsystem can break up a file between STRPAGGRP and ENDPAGGRP keywords and create a PDF file from each group.
FORCE (Force)	Forces a new sheet of paper for duplex printing. If currently printing on the front side of the sheet, the current sheet is ejected, and a new sheet is fed in.
INVMMAP (Invoke Medium Map)	Specifies the name of a medium map in a form definition. A medium map lets you select and change print parameters such as drawer, page rotation, overlays to use, finishing, and offset.
LPI (Lines Per Inch)	Changes lines per inch. When the LPI keyword is specified, it overrides the LPI parameter of the printer file.

Table 13. DDS Keywords for AFP Applications (continued)

OUTBIN (Output Bin)	Specifies the destination bin of the output on printers that support multiple output bins.
PAGRTT (Page Rotation)	Specifies the degree of rotation of the constants and text that is printed. It overrides the PAGRTT parameter value in the printer file.
STRPAGGRP (Start Page Group)	Begins a logical group of pages. The Infoprint Server PDF subsystem can break up a file between STRPAGGRP and ENDPAGGRP keywords and create a PDF file from each group. You can also include an e-mail address, mail tag, or index tag with this parameter for use with the PDF subsystem.

Page composition keywords: Most of these keywords enable program-to-system fields that are used to dynamically change the values of the keyword parameters while the application program is processing. These are record-level keywords unless otherwise specified.

Keyword	Description
BARCODE (Bar Code)	A field-level keyword that prints a field in a user-specified bar code in the specified height. DDS supports both linear and 2D bar codes.
BOX (Box)	Prints a box with the specified shading and color. You specify the box by specifying the down and across positions of two opposite corners, and then giving the line width. The corner co-ordinates can be specified dynamically.
CDEFNT (Coded Font Name)	A record- or field-level keyword that specifies the coded font for printing constants or fields. A coded font specifies an i5/OS-resident font by pointing to a specific font character set and code page.
CHRSIZ (Character Size)	Changes the width and height of a constant or field.
COLOR (Color)	Specifies the color for a field. Color is used by printers that support color, such as the 4224 printer, and by the AFP Viewer.
FNTCHRSET (Font Character Set)	A record- or field-level keyword that specifies the font character set used for printing constants or fields. You can specify point size for outline fonts.
FONT (Font)	A record- or field-level keyword that specifies the font ID used for printing constants or fields. You can specify the height and width for printer-resident outline fonts. This scaling can be uniform (by specifying only the height) but does not have to be.
GDF (Graphic Data File)	Prints a graphic data file created by a program such as BGU or GDDM.
HIGHLIGHT (Highlight)	Prints a field in bold characters. The active font for the field must be a numeric font (FONT keyword) that supports bold printing.
LINE (Line)	Prints a horizontal or vertical line. Lines are drawn by specifying the down and across starting positions, the horizontal and vertical direction, and the line width and length. Line coordinates can be specified dynamically.
OVERLAY (Overlay)	Prints an overlay at the specified location, with the specified rotation.
PAGSEG (Page Segment)	Prints a page segment at the specified location on the page, with the specified size and rotation.
POSITION (Position)	A field-level keyword used to specify the exact position of a field.

Table 13. DDS Keywords for AFP Applications (continued)

TXTRTT (Text Rotation)	A field-level keyword used to rotate fields.
UNDERLINE (Underline)	Underlines a field.
Finishing operation keywords:	
Keyword	**Description**
ZFOLD (Z-fold)	A record-level keyword that causes the current sheet to be first folded in half inwards (so the front side of the sheet is now inside the fold) along a line parallel to the reference edge. The half of the sheet furthest from the reference edge is again folded in half outwards along a line parallel to the reference edge. For example, when applied to an 11 by 17 inch sheet with the reference edge along a short side, the result is an 8.5 by 11inch fold-out.
STAPLE (Staple)	Turns on and off the stapling that is specified in the printer file. Use this keyword to staple groups of pages. The staple commands must be issued on a page boundary. There are three ways to use the STAPLE keyword. To staple consecutive groups of pages, such as pages 1-4 and 5-9, use STAPLE with no parameters on pages 5 and 10. To staple non-consecutive groups of pages, such as pages 1-4 and 7-10, use STAPLE(*OFF) on page 5 and STAPLE(*ON) on page 7 then STAPLE on page 11.

DDS Functions

Now that the DDS keywords have been introduced, we will show how these keywords are used in a sample case. Figure 50 on page 141 shows how DDS can be used to produce complex output.

Vertical/Horizontal lines and boxes

0123456784

01020304

Bar Code Symbologies

ROTATE
ROTATE
ROTATE
ROTATE

LARGE CHARACTERS

All Points addressability

一番   sCALE   氷

Overlay
Three

Multiple Overlays per page

Overlay One

IBM
Business
Partner

Overlay Two

Multiple Page Segments per page
Dynamic Positioning for OVL & PSG

IBM
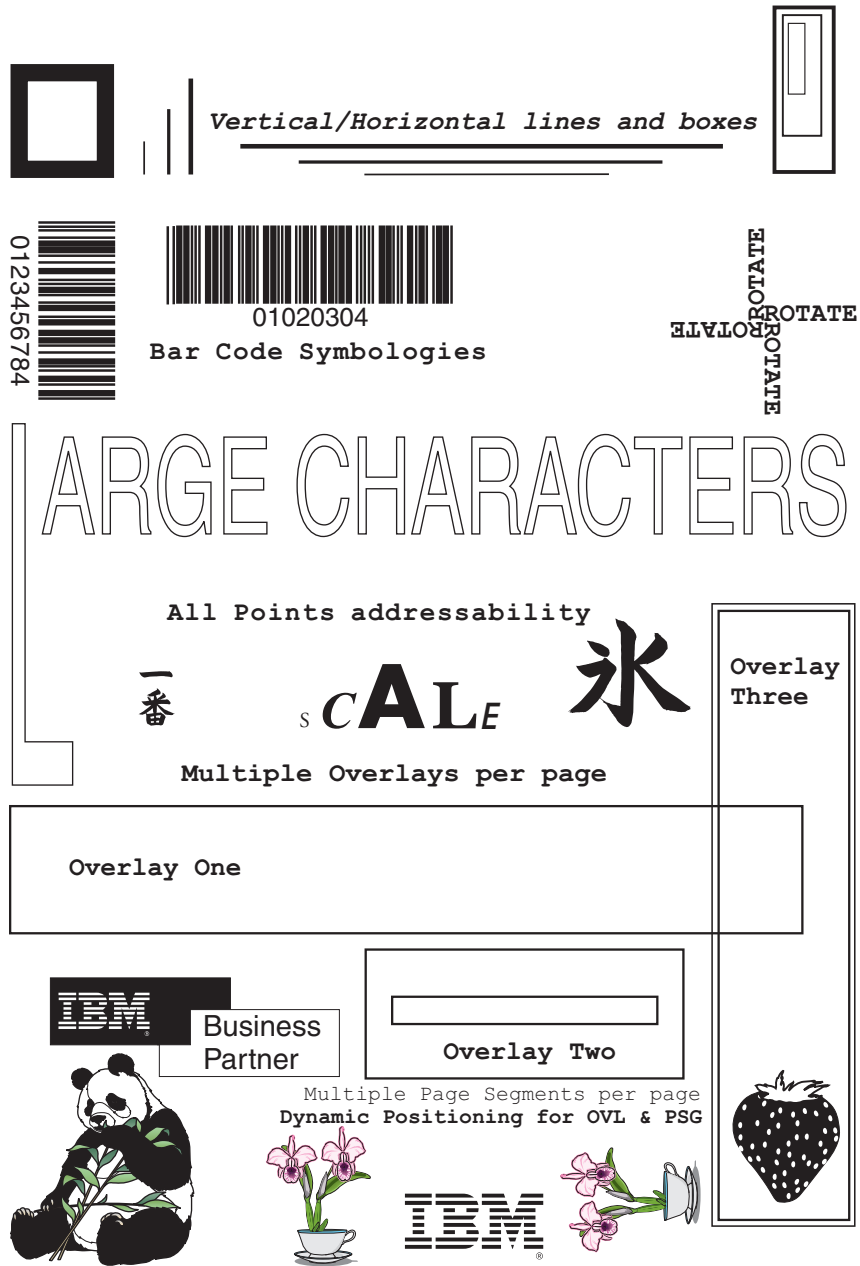
Figure 50. DDS Functionality

DDS Example

These are the DDS printer specifications used to produce the multiple function output example shown in Figure 50:

```
5722WDS V5R2M0                           SEU SOURCE LISTING
SOURCE FILE . . . . . . .   SAMPLER/QDDSSRC
MEMBER  . . . . . . . . .   DDSFUN
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ..
  100      A* DDSFUN: DDS for Functional DDS Demo
  200      A*
  300      A*      Printer File Parameters when compiling:
  400      A*
  500      A*      CHGPRTF FILE(DDSFUN) DEVICE(XXXXXXXX) TYPE(*AFPDS)
```

```
600        A*              OVRFLW(64)
700        A*
800        A         R HEADR1
900        A                                   PAGRTT(0)
1000       A*
1100       A*  'DDS Functionality'
1200       A*  - Helvetica Bold 20-pt using outline font
1300       A*  - Down 0.7 Across 3.0
1400       A*
1500       A         LIN01         35A
1600       A                                   FNTCHRSET(CZH400, POINTSIZE 20)
1700       A                                   POSITION(0.7 3.0)
1800       A*
1900       A*  'OS/400 V3R1 and later releases'
2000       A*  - Helvetica Reg 12-pt using outline font
2100       A*  - Var Positioning
2200       A*
2300       A         LIN02         35A
2400       A                                   FNTCHRSET(T1V10037, POINTSIZE 12)
2500       A                                   POSITION(&LINDWN &LINACR)
2600       A         LINDWN        5S 3P
2700       A         LINACR        5S 3P
2800       A*
2900       A*  LINE Parameters:
3000       A*  - Start Position Down
3100       A*  - Start Position Across
3200       A*  - Length (use UOM in printer file)
3300       A*  - *HRZ or *VRT
3400       A*  - Line Width
3500       A*
3600       A         R LINE1
3700       A                                   LINE(1.3 2.6 0.2 *VRT *NARROW
3800       A                                   LINE(1.1 2.8 0.4 *VRT *MEDIUM
3900       A                                   LINE(0.9 3.0 0.6 *VRT *WIDE)
4000       A                                   LINE(1.4 3.3 3.2 *HRZ *WIDE)
4100       A                                   LINE(1.5 3.7 2.4 *HRZ *MEDIUM
4200       A                                   LINE(1.6 4.1 1.6 *HRZ *NARROW
4300       A*
4400       A*  BOX Parameters
4500       A*  - Start Position Down
4600       A*  - Start Position Across
4700       A*  - Diag Position Down
4800       A*  - Diag Position Across
4900       A*  - Line width
5000       A*
5100       A         R BOX1
5200       A                                   BOX(0.8 1.0 1.5 2.0 .1)
5300       A                                   BOX(0.4 7.0 2.1 7.2 .02)
5400       A         R TXT0
5500       A         LIN08         35A    36 27
5600       A         LIN09         35A    50 31
5700       A                                51 33 'Dynamic Positioning for OVL
5800       A                                   FONT(85)
5900       A*  LIN03 'Vertical/Horizontal lines and boxes'
6000       A*        - Font 18 = Courier Italic
6100       A*  LIN04 'Bar Code Symbologies'
6200       A*  LIN05 'L'
6300       A*        - Font ADMWMOB = Open Block (GDDM)
6400       A*  LIN06 'arge Characters'
6500       A*        - Font ADMWMOB = Open Block (GDDM)
6600       A*  LIN07 'All Points Addressability'
6700       A*        - Font 46 = Courier Bold
6800       A*
6900       A         R TXT1
7000       A         LIN03         35A
7100       A                                   POSITION(1.3 3.3)
7200       A                                   FONT(18)
```

```
7300     A              LIN04          35A
7400     A                                   POSITION(3.1 2.4)
7500     A              LIN05           1A
7600     A                                   FONT(ADMWMOB)
7700     A                                   POSITION(2.9 1.0)
7800     A                                   CHRSIZ(9.0 20.0)
7900     A              LIN06          15A
8000     A                                   POSITION(3.4 1.3)
8100     A                                   FONT(ADMWMOB)
8200     A                                   CHRSIZ(6.0 6.0)
8300     A              LIN07          35A
8400     A                                   POSITION(4.8 2.0)
8500     A                                   FONT(46)
8600     A*   Print 'ROTATE' in 4 orientations
8700     A*
8800     A         R TXT3
8900     A              TXT1@1           6
9000     A                                   POSITION(2.7 6.4)
9100     A              TXT1@2           6    TXTRTT(90)
9200     A                                   POSITION(2.7 6.4)
9300     A              TXT1@3           6    TXTRTT(180)
9400     A                                   POSITION(2.7 6.4)
9500     A              TXT1@4           6    TXTRTT(270)
9600     A                                   POSITION(2.7 6.4)
9700     A*
9800     A* Bar Code Parameters:
9900     A* BARCODE (Type, Height, + 6 parameters:
10000    A* - Horizontal/Vertical: *HRZ,*VRT
10100    A* - Human Readable: *HRI,*HRITOP,*NOHRI
10200    A* - Asterisk  *AST, *NOAST
10300    A* - Check Digit: type
10400    A* - Unit Width: narrow bar/space
10500    A* - Wide/Narrow Ratio
10600    A*
10700    A         R BAR1
10800    A              BAR1@1           8S   BARCODE(INTERL2OF5 3 *VRT)
10900    A                                   POSITION(2.0 1.8)
11000    A              BAR2@1           8    BARCODE(CODE3OF9 3)
11100    A                                   POSITION(2.0 2.5)
11200    A*
11300    A* Print 'POSITION' with different offsets
11400    A*
11500    A         R TXT2
11600    A              TXT2@1           8    POSITION(5.3 3.5)
11700    A              TXT2@2           8    POSITION(5.35 3.55)
11800    A              TXT2@3           8    POSITION(5.4 3.6)
11900    A              TXT2@4           8    POSITION(5.45 3.65)
12000    A              TXT2@5           8    POSITION(5.5 3.7)
12100    A*
12200    A* Page Segment IBMLOGOT
12300    A* - dynamic name
12400    A* - dynamic position
12500    A*
12600    A         R PSG1
12700    A                                   PAGSEG(&PSGNAM &PSGDWN &PSGAC
12800    A              PSGNAM           8A P
12900    A              PSGDWN           5S 3P
13000    A              PSGACR           5S 3P
13100    A* Overlays
13200    A* - dynamic name
13300    A* - dynamic position
13400    A*
13500    A         R OVL1
13600    A                                   ENDPAGE
13700    A                                   OVERLAY(*LIBL/DDSOVL1 6.0 1.3
13800    A                                   OVERLAY(&OVLNM2 6.9 2.5)
13900    A                                   OVERLAY(DDSOVL3 &OV3DWN &OV3A
```

```
14000      A                                                OVERLAY(DDSOVL3 4.5 6.5)
14100      A                 OVLNM2        8A  P
14200      A                 OV3DWN        5S 3P
14300      A                 OV3ACR        5S 3P
                             * * * *   E N D   O F   S O U R C E   * * * *
```

The most significant print elements in the DDSFUN printer DDS specifications are:

Text   Text, whether constant or field data, is printed in a variety of ways in DDSFUN.

For more examples of specifying text in a document, see "Example" on page 92.

"DDS Functionality"(LIN01)

Printed in a 20-point Helvetica Roman-Bold font, 0.7 inches down and 3.0 inches across the page. The FRONTMGN parameter of the printer file is set to 0, so the down and across positions are measured from the top left edge of the page. Note that the POSITION keyword specifies the baseline or bottom left point of the first character to print.

The font is specified using FNTCHRSET, which defines the character set and code page to use. In the outline font CZH400, "CZ" is the prefix for outline fonts, "H" is for Helvetica, and "400" defines Roman Bold. The point size is specified separately with the POINTSIZE parameter.

This is a typographic font, part of the AFP Font Collection. For 300-pel printers, C0H400J0 is found in library QFNT300LA1. Code page T1V10037 is the USA and Canada code page, and it is normally located in library QFNTCPL.

"OS/400 V3R1 and Later releases"(LIN02)

Prints in Helvetica Roman-Medium 12-point, 0.9 inches down and 3.3 inches across the page. The FNTCHRSET value is CZH200. "CZ" is the outline font prefix, "H" is for Helvetica, and "200" is for Roman Medium. Dynamic positioning is used, with program variables LINDWN and LINACR loaded with the down and across values and referenced in the DDS as program-to-system fields.

"Vertical/Horizontal lines and boxes"(LIN03)

Prints in Courier Italic printer-resident font, starting 1.3 inches down and 3.3 inches across the page. The keyword FONT(18) specifies Courier Italic.

"Bar Code Symbologies"(LIN04)

Prints in Courier 10, which is the default font. In this case it is specified as font identifier 011 in the printer device description.

"L"(LIN05)

L is printed in the Open Block font scaled by the CHRSIZ keyword to 9.0 width and 20.0 height. ADMWMOB is the Open Block font and it is a GDDM scalable font located in the QGDDM library.

"arge Characters"(LIN06)

Also prints in Open Block, but is scaled to 6.0 wide and 6.0 high.

"All points addressability"(LIN07)

Prints in Courier Bold, which is FONT(46).

"Multiple Overlays per page"(LIN08)

Prints in the default font, Courier - FONT(011).

"Multiple Page Segments per page"(LIN09)
Prints in the default font, Courier - FONT(011).

"Dynamic Positioning for OVL and PSG"
Prints in font 85, Prestige Elite.

"Rotate"
Prints the fields TXT1@1 through TXT@4 in the four different rotations: 0, 90, 180, and 270. Each field from TXT@1 through TXT@4 contains the character "ROTATE". TXTRTT is valid only for fields and not for constants. Note how the POSITION (2.7 inches down and 6.4 inches across the page) defines a baseline starting point for each rotation.

Lines Three vertical and three horizontal lines are printed. The first vertical line begins at a point 1.3 inches down and 2.6 inches across the page, and has a length of 0.2 inches. The line width is *NARROW, 0.008 inches.

All five parameters of the LINE keyword can be program-to-system variables, enabling the application to dynamically draw lines.

Boxes Two boxes are drawn in the DDSFUN example. The first, thicker box is defined by top left (0.8 inch down, 1.0 inch across the page) and bottom right (1.5 inches down, 2.0 inches across the page) positions. The box width is 0.1 inch. Box width also can be specified by the *NARROW, *MEDIUM, and *WIDE special values.

All five parameters of the BOX keyword can be program-to-system variables, enabling the application to dynamically draw boxes.

Page Segments
The page segments explicitly placed on the DDSFUN page are IBM logos. The largest IBM logo is a page segment object (*PAGSEG) called IBMLOGOT, and is positioned 8.7 inches down and 3.6 inches across the page. Unlike text, this position marks the top left point of the page segment image (top left when printed in standard, or 0 rotation).

Note that the strawberry image, a page segment called "STRWNB", is not explicitly placed by DDS. It is included in Overlay Three.

The three IBM logos are placed using program-to-system variables, enabling the application to dynamically position images.

Overlays
Three very simple overlays are depicted in the DDSFUN example. While the overlays used with the Super Sun Seeds case study are more familiar and realistic, these overlays demonstrate how overlays are used by DDS.

Overlay One is an i5/OS overlay object (*OVL) called DDSOVL1. It is placed 6.0 inches down and 1.3 inches across the page. Again, this is relative to the page margins and marks the top left point of the overlay.

Overlay Two is dynamically referenced from the program by the variable OVLNM2.

Overlay Three is dynamically positioned from the program by the variables OV3DWN and OV3ACR for down and across, respectively.

Bar Codes
Two examples of bar codes are specified.

The field BAR1@1 is printed vertically in the Interleaved 2 of 5 bar code symbology, starting at 2.0 inches down and 1.8 inches across the page. The

bar code is printed with a height of 3, which at 6 LPI prints a 1/2-inch high bar code. Interleaved 2 of 5 is a numeric-only bar code. The human readable field value (012345678) is printed below the bar code, along with the check digit (4).

The field BAR2@1 is printed horizontally in the Code 3 of 9 bar code symbology, starting at 2.0 inches down and 2.5 inches across the page. It prints horizontally because *HRZ is the default. The human readable (01020304) field value is also the default. Note that Code 3 of 9 is an alphanumeric bar code (up to 50 characters), and does not include a check digit.

RPG for Example

This is the RPG programming specifications used to produce the multiple function output example shown in Figure 50 on page 141:

```
5722WDS V5R2M0                              SEU SOURCE LISTING
SOURCE FILE . . . . . . .   SAMPLER/QRPGSRC
MEMBER   . . . . . . . . .  DDSFUN
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ..
  100      H
  200      H* DDSFUN: DDS Functional Demo
  300      H*
  400      H*  Uses the printer file DDSFUN.
  500      H*
  600      FDDSFUN  O   E                    PRINTER
  700      E                   DTA    1  10  8            Constant Data
  800      E                   LIN    1   9 35            Title Lines
  900       *
 1000      IFIELDS     DS
 1100      I                                    1 315 LIN
 1200      I                                    1  35 LIN01
 1300      I                                   36  70 LIN02
 1400      I                                   71 105 LIN03
 1500      I                                  106 140 LIN04
 1600      I                                  141 141 LIN05
 1700      I                                  176 190 LIN06
 1800      I                                  211 245 LIN07
 1900      I                                  246 280 LIN08
 2000      I                                  281 315 LIN09
 2100       *
 2200      C                   MOVE DTA,1    BAR1@1  80        12345678
 2300      C                   MOVE DTA,2    BAR2@1  8         01020304
 2400      C*
 2500      C                   MOVE 'ROTATE' TXT1@1  6         ROTATE ex.
 2600      C                   MOVE TXT1@1   TXT1@2  6
 2700      C                   MOVE TXT1@1   TXT1@3  6
 2800      C                   MOVE TXT1@1   TXT1@4  6
 2900      C*
 3000      C                   MOVE DTA,3    TXT2@1  8         POSITION ex.
 3100      C                   MOVE DTA,3    TXT2@2  8
 3200      C                   MOVE DTA,3    TXT2@3  8
 3300      C                   MOVE DTA,3    TXT2@4  8
 3400       *
 3500      C                   Z-ADD0.9      LINDWN  53        Var Positionin
 3600      C                   Z-ADD3.3      LINACR  53
 3700      C                   WRITEHEADR1
 3800      C                   WRITELINE1
 3900      C                   WRITEBOX1
 4000       *
 4100      C                   WRITETXT0
 4200      C                   WRITETXT1
 4300      C                   WRITEBAR1
 4400      C                   WRITETXT2
 4500      C                   WRITETXT3
```

```
4600        *
4700        C                          MOVE 'IBMLOGOT'PSGNAM  8      Var Image (Page
4800        C                          Z-ADD8.7    PSGDWN  53      Var Positioning
4900        C                          Z-ADD3.6    PSGACR  53
5000        C                          WRITEPSG1
5100         *
5200        C                          MOVE 'IBMLOGO 'PSGNAM
5300        C                          Z-ADD8.8    PSGDWN  53
5400        C                          Z-ADD5.3    PSGACR  53
5500        C                          WRITEPSG1
5600         *
5700        C                          MOVE 'IBMSMALL'PSGNAM
5800        C                          Z-ADD9.35   PSGDWN  53
5900        C                          Z-ADD6.8    PSGACR  53
6000        C                          WRITEPSG1
6100         *
6200        C                          MOVE 'DDSOVL2 'OVLNM2  8      Var Overlay
6300        C                          Z-ADD4.4    OV3DWN  53      Var Positioning
6400        C                          Z-ADD6.3    OV3ACR  53
6500        C                          WRITEOVL1
6600         *
6700        C                          SETON                    LR
6800 **    BAR    Bar code data
6900 12345678
7000 01020304
7100 POSITION
7200 **    LIN    LINES DATA
7300 DDS Functionality
7400 OS/400 V3R1 and later releases
7500 Vertical/Horizontal lines and boxes
7600 Bar Code Symbologies
7700 L
7800 ARGE CHARACTERS
7900 All Points addressability
8000 Multiple Overlays per page
8100 Multiple Page Segments per page
                           * * * *  E N D  O F  S O U R C E  * * * *
```

Floating Document Elements

Because DDS can variably place document elements such as lines, boxes, page
segments, and overlays, you can precisely tailor the output to the application data.
You can float these elements on the page; that is, actually change the document
structure as the data changes.

For example, consider a brokerage statement. It has sections for portfolio
transactions, checking transactions, portfolio balances, and other categories. The
transactions are all placed in separate boxes or frames on the statement. Those
frames end when the customer transactions end. The result is a document tailored
for that customer.

As shown in "Using DDS for Super Sun Seeds" on page 149, you can use DDS to
accomplish the same thing. While the invoice was tailored depending on whether
it was a one, two, or more page document, it still has a fixed frame for the detailed
line items. A customer invoice with five line items has a frame that is part of the
35 line item overlay. If DDS line keywords are used, the frame can be built
dynamically; that is, as line items are processed. If five line items are all the
customer needs, that is all that is drawn.

Program INVNEW3 implements the Super Sun Seeds invoice as a floating
document. A sample of the output is shown below.

400 CPU Parkway
Vegetation, NJ 55090

SUPER SUN SEEDS.com

Office: 555-499-2367
Fax: 555-415-9794

```
IMPROVED PRINTING CORP
PERFORMANCE BOULEVARD
PRINTERSVILLE
CO  45789-2637
          -- Sold To --                                 -- Ship To --
```

| Customer Number: | 100 | Invoice Number: | 31300 | Invoice Date: | 3/13/02 | Payment Date: | 4/13/02 |

Ship Via:BEST WAY Ship Date: 3/13/02 Terms:NET 30 Rep: YOUR PRINTER REP

Qty	UOM	Item #	Item Description	Price	Extension
1	PK	01100517	SPARTAN SEEDS	2.39	2.39
9	PK	04569870	NORTHERN LITE BLUE SPRUCE	858.32	7,724.88
12	BX	11005004	BUSH GREEN SEEDS	2.50	30.00
12	CT	11005011	LASSO RED SEEDS	892.23	10,706.76
26	PK	11005018	EARLY BANTAM SEEDS	.38	9.88
5	BX	11057893	AFRICAN DAISY, SEEDS	2.35	11.75
1	PK	15975365	HEAVY OAK	129.09	129.09
33	BX	32746510	HOPS BREWING LIGHT	1.20	39.60
6	EA	46578913	SEED SURVEYING SITE	50.00	300.00
2	BX	56412113	POT POT	7.65	15.30
80	PK	65412384	SEED SCRUBBER	888.79	71,103.20
1	PK	84512023	OREGON SPRING TOMATO SEED	.97	.97
2	DZ	96325874	PINEAPPLE-ORANGE SEED	1.29	2.58
11	BX	98412006	BLACK BEAUTY ZUCCHINI	2.30	25.30
5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50
1	CT	00000300	HIGH ALTITUDE WATERMELON	1.01	1.01

Thank You . . . . .
Because you have ordered over $500 of seeds this year, on your next seed order you will receive a 10% discount.

This invoice overlay designed using IBM AFP Utilities/400   Total Due $90,652.21

Return this tear-off strip with your payment.   *Make Checks Payable to:*   **Super Sun Seeds**
Payment is due by: 4/13/02   Amount Due is: $90,652.21

```
IMPROVED PRINTING CORP
PERFORMANCE BOULEVARD
PRINTERSVILLE
CO  457892637
```

File Copy   Page 1

Figure 51. Super Sun Seeds Invoice as Floating Document

Similarly, you can float other elements of the document. For example, instead of placing the variable page segment at a fixed position, you can float it to where you want it to appear on the invoice then close the frame.

Positioning

AFP provides the ability to precisely position any document element anywhere on the page. You can also position information in any sequence. Traditional SCS output uses row and column positioning, working sequentially down the page. DDS supports both methods of positioning information. For many output applications (including the Super Sun Seeds invoicing example), row and column positioning is still a good approach. With the example, the use of absolute positioning is minimized (absolute positioning uses down and across parameters, or the POSITION keyword).

Absolute positioning is not required here, and it takes more work. You cannot combine row and column and absolute positioning in the same record format. With the INVNEW1 example, separate record formats were coded where absolute positioning was needed. This is also true with the enhanced invoicing examples, INVNEW2 and INVNEW3. For example, line 6500 in "DDS for New Invoice Output" on page 153 specifies absolute positioning.

One aid to positioning is a "grid" overlay, shown in Figure 52 on page 149. This grid can be printed with the raw invoicing data. It can be a very effective tool in

building your electronic output. In the example, the grid would match the spacing of the application: 6 lines to the inch for rows, 10 characters per inch for columns.

```
1234567890123456789012345678901234567890123456789012345678901234567890123456789012345

          IMPROVED PRINTING CORP                SAME
          PERFORMANCE BOULEVARD
          PRINTERSVILLE
          CO      45789-2637

              100                  31300            4/05/02        5/05/02

         1  CT    0000003000      HIGH ALTITUDE WATERMELON              1.01
         1  PK    0226742401      SPARTAN SEEDS                         2.39
         9  PK    0295218117      NORTHERN LIGHT BLUE SPRUCE          858.32
         2  BX    0249275022      BUSH GREEN SEEDS                      2.50
         4  CT    0503860432      LASSO RED SEEDS                     892.23
         6  PK    1478053000      EARLY BANTAM SEEDS                     .38
         8  BX    9576214560      AMERICAN DAISY SEEDS                  2.35
         1  PK    5927869395      HEAVY OAK                             8.19
         2  EA    6038747575      OREGON SPRING TOMATO SEED             4.11

                                  Thank you. . .
                                  Because you have ordered
                                  over $500 of seeds this
                                  year, on your next seed
                                  order you will receive
                                  a 10% discount.
```

Figure 52. Grid Overlay

Using DDS for Super Sun Seeds

The case study discussed in this section takes a standard invoice application, Super Sun Seeds, (see Figure 3 on page 13) and using the functions described earlier, transforms the invoice into DDS-enhanced output.

Consider the pre-DDS Super Sun Seeds invoice, which is printed on multi-part, preprinted forms on an impact printer. The preprinted form provides the invoice form, but it limits the preprinted format to one form, with the same heading, detail, and total elements on each page. Multi-page invoices are customized by printing **Continued** in the **Total Due** box, and by specifying a page number. Invoice output is naturally collated, whether the workflow requires it or not (it usually does not). Uncollated pages are obtained by bursting and de-collating preprinted forms and by placing them in separate stacks.

The new DDS version of the Super Sun Seeds application (program INVNEW1) is a tailored, multi-page electronic invoice. The fictional customer, Improved Printing Corporation, has 16 line items so their invoice fits on one page as shown in Figure 53 on page 150.

Figure 53. New One Page DDS Version of Super Sun Seeds Invoice

The fictional customer, Organic Garden Supplies, on the other hand, has ordered 46 items so their invoice is two pages long. The first page of their invoice is shown in Figure 54 on page 151.

```
┌─────────────────────────────────────────────────────────────────────────────┐
│                                                                               │
│  400 CPU Parkway           SUPER SUN SEEDS.com        Office: 555-499-2367     │
│  Vegetation, NJ  55090                                Fax:    555-415-9794    │
├─────────────────────────────────────────────────────────────────────────────┤
│ ┌                        ┐    ┌                                     ┐          │
│    ORGANIC GARDEN SUPPLIES        ORGANICS-ON-THE-MOVE                         │
│    546 PRODUCE WAY                3872 NATURE'S WAY                             │
│    GOLDENOATS                     NOCHEMS                                       │
│    CO    94523-4852               AK   49972-5341                              │
│ └                        ┘    └                                     ┘          │
│          -- Sold To --                      -- Ship To --                      │
├─────────────────────────────────────────────────────────────────────────────┤
│ Customer     136   Invoice  31336   Invoice  3/13/02  Payment  4/13/02         │
│ Number:            Number:          Date:             Date:                    │
├─────────────────────────────────────────────────────────────────────────────┤
│ Ship Via:CLEAN TRK Shipped Date: 3/13/02 Terms:NET 30  Rep:CHRIS SEEDER        │
└─────────────────────────────────────────────────────────────────────────────┘
```

Qty	UOM	Item #	Item Description	Price	Extension
90	CT	00000300	HIGH ALTITUDE WATERMELON	1.01	90.99
550	CT	00000300	HIGH ALTITUDE WATERMELON	1.01	555.50
100	EA	00001200	ARBOLES DEL SUR	45.00	4,500.00
25	EA	00231300	SEED ROASTER OVEN SET	199.99	4,999.75
150	PK	04569870	NORTHERN LITE BLUE SPRUCE	858.32	28,748.00
2	BX	11005000	FAVA SEEDS	3.90	7.80
2	BX	11005001	PURPLE TEEPEE SEEDS	4.44	8.88
52	BX	11005002	BUSH WAX SEEDS	2.00	104.00
52	BX	11005003	KINGHORN WAX SEEDS	2.13	110.76
8	BX	11005004	BUSH GREEN SEEDS	2.50	20.00
8	BX	11005005	BLUE LAKE GREEN SEEDS	4.00	32.00
2	BX	11005006	KINGHORN WAX SEEDS	3.00	6.00
2	CT	11005007	VENTURE GREEN SEEDS	1.50	3.00
100	CT	11005008	NORTHEASTERN POLE SEEDS	1.29	129.00
100	CT	11005009	KENTUCKY BLUE SEEDS	2.10	210.00
58	CT	11005010	EARLY DWARF DANISH SEEDS	3.01	174.58
58	CT	11005011	LASSO RED SEEDS	892.23	51,749.34
84	EA	11005012	BLUE MAX SAVOY BEANS	1.23	103.32
84	DZ	11005013	MINCOR NANTES CARROT SEEDS	.87	73.08
10	DZ	11005014	SCARLET NANTES SEEDS	5.90	59.00
5	DZ	11005014	SCARLET NANTES SEEDS	5.90	29.50
10	BZ	11005015	CHANTENAY SEEDS	2.19	21.90
63	BZ	11005016	TOUCHON SEEDS	2.83	178.29
65	BZ	11005016	TOUCHON SEEDS	2.83	183.95
2	PK	11005018	EARLY BANTAM SEEDS	.38	.76
2	PK	11005019	NORTHERN PICKLING SEEDS	.39	.78
90	PK	11005020	FRENCH PICKLING SEEDS	2.39	215.10
100	BX	11057893	AFRICAN DAISY, SEEDS	2.35	235.00
25	CT	12382910	SUCCOTASH SEEDS	.38	9.50
45	CT	13145340	SOUR GRAPE SEEDS	.15	6.75
10	PT	15789342	BLUE BELLS, BRIGHT BLUE	18.57	185.70
50	PK	15975365	HEAVY OAK	129.09	6,454.50
25	EA	31321654	BELLSTAR SEEDS	7.88	197.00
2	EA	31321654	BELLSTAR SEEDS	7.88	15.76
25	DZ	32154657	PETERSBURG PALM TREE	34.90	872.50
6	BZ	32165478	BLACK EYED BANANA	3.01	18,06
45	BX	32746510	HOPS BREWING LIGHT	1.20	54.00
10	CT	35456031	SUNNY SUNFLOWER SEEDS	1.23	12.30

This invoice overlay designed using IBM AFP Utilities/400   Page 1

Figure 54. Page One of Two-Page DDS Version of Super Sun Seeds Invoice

The second page of the Organic Garden Supplies invoice consists of a shortened
heading, sales offer (with strawberry image), and the payment coupon as shown in
Figure 55 on page 152.

400 CPU Parkway		SUPER SUN SEEDS.com			**Office: 555-499-2367**	
Vegetation, NJ 55090					**Fax: 555-415-9794**	

ORGANIC GARDEN SUPPLIES

Customer Number:	136	Invoice Number:	31336	Invoice Date:	3/13/02	Payment Date:	4/13/02

Qty	UOM	Item #	Item Description	Price	Extension
50	EA	35715924	SEED SIFTER SET	2,900.00	45,000.00
18	EA	40113254	FRESH FRUIT CANNED CANNER	22.97	413.46
6	BX	5613213	POT POT	7.65	45.90
1000	PK	64132029	PITLESS PEACH SEEDS	.97	970.00
500	EA	90978412	TREE TRIMMER TUBING	.20	100.00
6	CT	94875081	EARLIROUGE TOMATO SEEDS	.49	2.94
45	BX	98412006	BLACK BEAUTY ZUCCHINI	2.30	103.50
5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50

Thank You . . . . .
Because you have ordered over $500 of fruit this year, on your next fruit order you will receive a 10% discount.

This invoice overlay designed using IBM AFP Utilities/400   Total Due $147,561.56

Return this tear-off strip with your payment.   *Make Checks Payable to:*   ***Super Sun Seeds***
Payment is due by: 4/13/02   Amount Due is: $147,561.56

   ORGANIC GARDEN SUPPLIES
   546 PRODUCE WAY
   GOLDENOATS
   CO 94523-4852

Figure 55. Page Two of Two-Page DDS Version of Super Sun Seeds Invoice

Multiple overlays are used to customize the format for one, two, and more page invoices, as shown in Figure 56 on page 153. This approach can be more customized by using a floating overlay (see "Floating Document Elements" on page 147) so that the electronic form exactly matches the individual customer transactions. Additionally, a postal bar code can be added to the address, as well as a payment coupon with the customer number and invoice amount encoded in bar code, and a custom marketing offer with tailored images and discounts.

We need to construct a different overlay for all of the possible scenarios. For example, a one page invoice can fit the full ship to and bill to heading, the item detail lines, and payment coupon all on one page. The invoice only uses the INVALL overlay. A multiple page invoice would have the full heading with item details on the first page (INVFST), the continuation heading and item details on the middle pages (INVMID), and the continuation heading, item details and payment coupon on the last page (INVLST). The overlays we constructed are shown in Figure 56 on page 153.
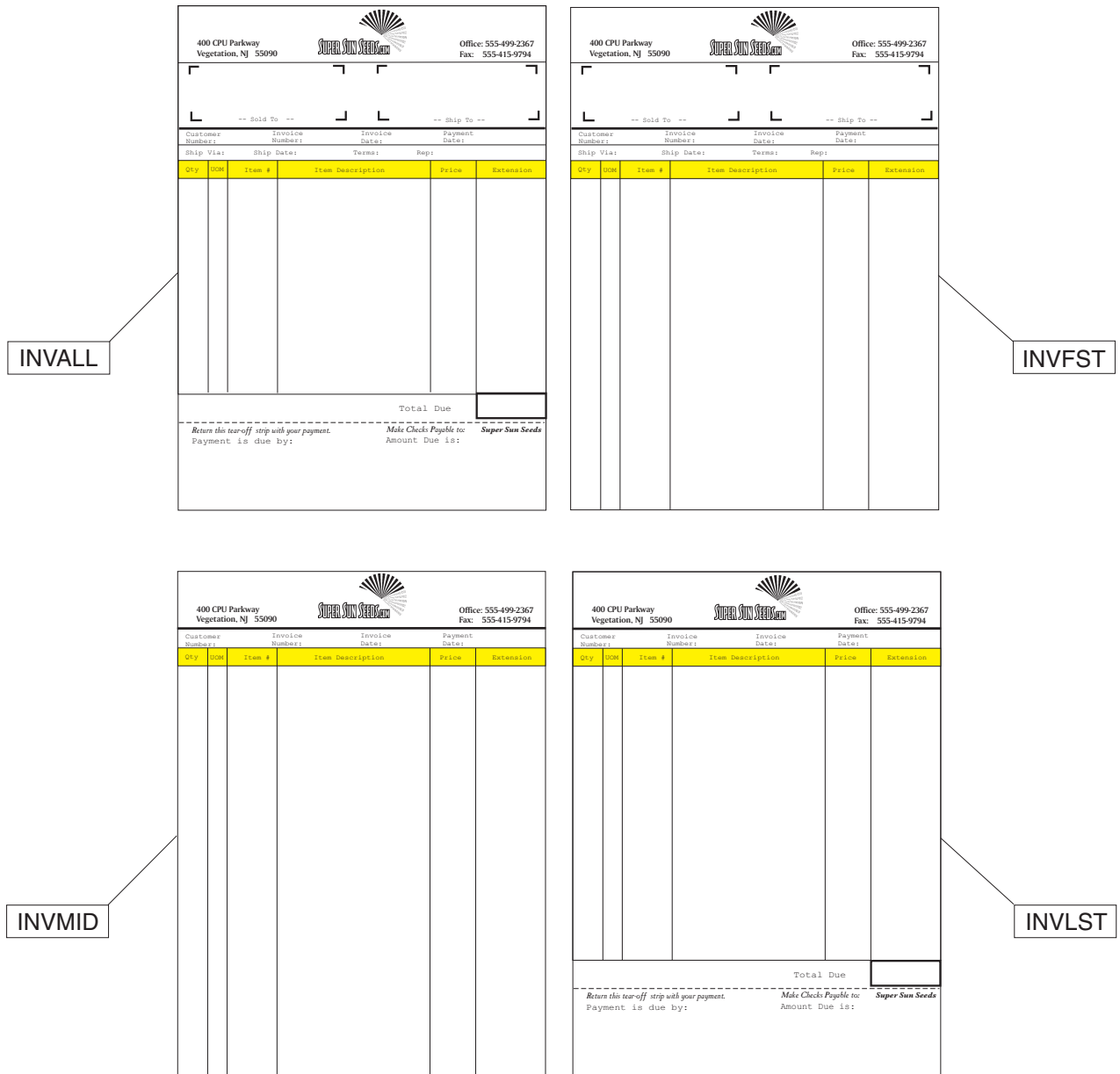
Figure 56. Electronic Overlays on New DDS Super Sun Seeds Invoice

DDS for New Invoice Output

The DDS printer specifications used to produce the overlays shown in Figure 56 are given:

```
5722WDS V5R2M0                         SEU SOURCE LISTING      10/10/02 17:47:39      1
SOURCE FILE . . . . . . .    SAMPLER/QDDSSRC
MEMBER  . . . . . . . . .    INVNEW2
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
  100      A*  INVNEW2 - Printer File DDS for Super Sun Seeds Invoice
  200      A*           Example 2 (copies and duplex function added)
  300      A*
  400      A*   Printer File Create or Change Parameters:
  500      A*    - Printer Device Type (DEVTYPE)     *AFPDS
  600      A*    - Overflow Line (OVRFLW)            64
```

```
700      A*    - Print on Both Sides (DUPLEX)        *YES
800      A*          if running on duplex printer
900      A*
1000     A* Page 1 Header
1100     A*- includes Postnet Zip+4
1200     A*
1300     A            R INVTOP                   SKIPB(10)
1400     A              ZIPPN         9S      12 BARCODE(POSTNET)
1500     A                                       SPACEA(2)
1600     A              NAME          25A     12
1700     A              STNAME        25A     48
1800     A                                       SPACEA(1)
1900     A              STREET        25A     12
2000     A              STSTRT        25A     48
2100     A                                       SPACEA(1)
2200     A              CITY          25A     12
2300     A              STCITY        25A     48
2400     A                                       SPACEA(1)
2500     A              STATE         2A      12
2600     A              ZIP           9S      16 EDTWRD('    -    ')
2700     A              STSTE         2A      48
2800     A              STZIP         9S      52 EDTWRD('    -    ')
2900     A                                       SPACEA(3)
3000     A              CUST#         6S 0    14 EDTCDE(Z)
3100     A              INVC#         6S 0    32 EDTCDE(Z)
3200     A                                    49DATE EDTCDE(Y)
3300     A              PAYDAT        6S 0    66EDTCDE(Y)
3400     A                                       SPACEA(2)
3500     A              SHPVIA        10A     14
3600     A                                    34DATE EDTCDE(Y)
3700     A              TERMS         10A     47
3800     A              SLSMAN        16A     64
3900     A                                       SPACEA(4)
4000     A*
4100     A* Page 2 Header
4200     A*
4300     A            R INVTP2                   SKIPB(10)
4400     A              NAME          25A     12
4500     A                                       SPACEA(2)
4600     A              CUST#         6S 0    14 EDTCDE(Z)
4700     A              INVC#         6S 0    32 EDTCDE(Z)
4800     A                                    49DATE EDTCDE(Y)
4900     A              PAYDAT        6S 0    66EDTCDE(Y)
5000     A                                       SPACEA(4)
5100     A*
5200     A* Detail Lines
5300     A*
5400     A            R DETLIN                   SPACEA(1)
5500     A              QTY           4S 0     8 EDTCDE(Z)
5600     A              UOM           2A      13
5700     A              ITEM#         8S 0    18
5800     A              ITMDES        25A     28
5900     A N51          SELPRC        6S 2    58 EDTCDE(J)
6000     A N51          EXTPRC        7S 2    70 EDTCDE(J)
6100     A*
6200     A* Multipage Message
6300     A*
6400     A            R PAGEOF
6500     A              PAGCON        4A         POSITION(10.7 7.3)
6600     A                                       FNTCHRSET(C0H200A0 T1V10037)
6700     A              PAGCNT        2S 0       POSITION(10.7 7.8)
6800     A                                       FNTCHRSET(C0H200A0 T1V10037)
6900     A                                       EDTCDE(Z)
7000     A              PAGNAM        25A        POSITION(10.7 3.8)
7100     A                                       FNTCHRSET(C0H400B0 T1V10037)
7200     A*
7300     A* Invoice Totals
```

```
7400        A* - includes Interleaf 2 of 5 bar code
7500        A*
7600        A           R INVBOT                    SKIPB(51)
7700        A N51         TOTDUE         9S 2    67 EDTWRD(',    ,  $0.  -')
7800        A                                       SPACEA(4)
7900        A  51                         67 ' '
8000        A                                       SPACEA(4)
8100        A           PAYDA@         6S 0    25 EDTCDE(Y)
8200        A N51         TOTD@2         9S 2    67 EDTWRD(',    ,  $0.  -')
8300        A                                       SPACEA(2)
8400        A  51                         67 ' '
8500        A                                       SPACEA(2)
8600        A           NAME@2        25A      12
8700        A                                       SPACEA(1)
8800        A           STRE@2        25A      12
8900        A           BARPRC        15S 0    52BARCODE(INTERL2OF5 3)
9000        A                                       SPACEA(1)
9100        A           CITY@2        25A      12
9200        A                                       SPACEA(1)
9300        A           STAT@2         2A      12
9400        A           ZIP@2          9A      16
9500        A*
9600        A* Offer Print
9700        A* - Font 92 is Courier Italic 12-pitch
9800        A*
9900        A           R OFFER                     SKIPB(43)
10000       A                                       FONT(92)
10100       A           OFFR@1        24A      36
10200       A                                       SPACEA(1)
10300       A           OFFR@2        24A      36
10400       A                                       SPACEA(1)
10500       A           OFFR@3        24A      36
10600       A                                       SPACEA(1)
10700       A           OFFR@4        24A      36
10800       A                                       SPACEA(1)
10900       A           OFFR@5        24A      36
11000       A                                       SPACEA(1)
11100       A           OFFR@6        24A      36
11200       A                                       SPACEA(1)
11300       A*
11400       A* Images/Page Segments
11500       A* - variable page segment name from program
11600       A*
11700       A           R PAGSEG                    PAGSEG(&PSEG 7.0 2.6)
11800       A           PSEG           8A  P
11900       A*
12000       A*
12100       A* Images/Page Segments
12200       A* - variable overlay name from program
12300       A*
12400       A           R PRTOVL                    OVERLAY(&OVRLAY 0 0)
12500       A           OVRLAY         8A  P
12600       A*
12700       A* Forces page advance
12800       A*
12900       A           R ENDPAG                    ENDPAGE
                        * * * * E N D  O F  S O U R C E  * * * *
```

The printer file DDS used to create the invoice output shown in Figure 56 on page
153 is divided into seven records as follows:

INVTOP   Full invoice heading information
INVTP2   Continuation heading, on multipage invoice
DETLIN   Detail lines format
INVBOT   Invoice bottom, or payment coupon
OFFER   Discount offer

| PAGSEG | Print variable page segment, using: |

FLWRNB Seed Image
STRWNB Strawberry Image
TREENB Tree Image
BETLNB Beetle Image

| PRTOVL | Print variable overlay, as follows: |

INVALL Whole or 1-page invoice overlay
INVFST First page of multipage invoice overlay
INVMID Middle page of multipage invoice overlay
INVLST Last page of multipage invoice overlay

RPG Source for New Invoice Output (INVNEW1)

This is the RPG source used to produce the new Super Sun Seeds invoice output example shown in Figure 56 on page 153.

```
5722WDS V5R2M0                          SEU SOURCE LISTING      10/10/02 17:47:39      1
SOURCE FILE . . . . . . .  SAMPLER/QRPGSRC
MEMBER  . . . . . . . . .  INVNEW1
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
  100      * INVNEW1 - Super Sun Seeds Electronic Invoice
  200      *           Example 1
  300      *
  400      *  This program reads a transaction file (SEEDDETL), retrieves info
  500      *  from item master (SEEDITEM) and customer master (SEEDCUST), then
  600      *  prints invoices.
  700      *
  800      *  Different electronic overlays are used depending on whether this
  900      *  is a one page or multipage invoice, as well as whether there is
 1000      *  room remaining on the invoice to print a customer offer.  The following
 1100      *  overlays are used:
 1200      *
 1300      *    INVALL     1-page invoice (full address at top, payment at bottom)
 1400      *    INVFST     Page 1 of multipage invoice (no payment at bottom)
 1500      *    INVMID     Continuation page (No address, payment at bottom)
 1600      *    INVLST     Last page of multipage invoice
 1700      *
 1800      *  Invoice detail lines are processed until either end of customer order
 1900      *  or lines=35, at which time the invoice page is printed.  At end of
 2000      *  order, a check is made to see if there are more than 18 detail lines
 2100      *  to print.  If there are, that would not leave room in the invoice body
 2200      *  to print the customer offer.  In this case, the page is printed, and a
 2300      *  new  final page is built with the offer and the payment coupon.
 2400      *
 2500      *  The offer is a message (and corresponding image, or page segment) based
 2600      *  on item sales in the customer master.  For example, a flower image
 2700      *  would print if seed sales exceeded $500.
 2800      *
 2900      *  ENHANCEMENTS:
 3000      *  See program INVNEW2 for the following functional enhancements:
 3100      *
 3200      *     1. Multiple copies of invoice with routing designation, such as
 3300      *        "Customer Copy", "File Copy", etc.
 3400      *     2. Overlay specifying terms and conditions to print on back of
 3500      *        customer copy.
 3600      *     3. Packing List copy that suppresses prices
 3700      *
 3800      FSEEDDETLIP E           K         DISK
 3900      FSEEDITEMIF E           K         DISK
 4000      FSEEDCUSTIF E           K         DISK
 4100      FINVNEW1 O  E                     PRINTER
 4200      *
 4300      E              WDS    1  40 24             Text for Offer
 4400      *
 4500      IINVCDETL     01
 4600      I                                        STNAME       32
```

```
4700      I                                             CUST# L1
4800      ICUSTDATA    02
4900      IITEMDATA    03
5000       *
5100      IBARTOT      DS
5200      I                                  1   60CUST#
5300      I                                  7  152TOTDUE
5400       *
5500      IPAYDAA      DS
5600      I                                  1   20PAYMO
5700      I                                  3   40PAYDA
5800      I                                  5   60PAYYR
5900       *
6000      C            *IN90    IFEQ '0'                      First Pass Only
6100      C                     SETON                    90
6200      C                     EXSR DATESR
6300      C                     MOVEL'Page'    PAGCON  4      Page constant
6400      C                     ENDIF
6500       *
6600      C            *INL1    IFEQ '1'                      Start Customer
6700      C            CUST#    ADD  31200    INVC#   60      Invent Invoice#
6800      C                     Z-ADD0        TOTDUE  92      Reset Totals/Ctrs
6900      C                     Z-ADD0        ITMCNT  30
7000      C                     Z-ADD0        PAGCNT  20
7100      C            CUST#    CHAINSEEDCUST          20
7200      C    32              MOVEL'    SAME'STNAME
7300      C                     Z-ADDZIP      ZIPPN   90
7400      C*
7500      C                     WRITEINVTOP
7600      C*
7700      C                     ENDIF
7800      C*
7900      C            *IN01    CABNE'1'     ENDDET           Item Processing
8000      C                     ADD  1        ITMCNT
8100      C            ITM1     CHAINSEEDITEM         21
8200      C*
8300      C            QTY1     MULT SELPRC   EXTPRC  72
8400      C                     Z-ADDQTY1     QTY     40
8500      C            EXTPRC   ADD  TOTDUE   TOTDUE
8600      C*
8700      C                     WRITEDETLIN                   Write Detail Line
8800      C*
8900      C            ITMCNT   IFEQ 35                       Full 1st Page
9000      C                     ADD  1        PAGCNT
9100      C            PAGCNT   IFEQ 1
9200      C                     MOVE 'INVFST 'OVRLAY  8        Long Page 1 Ovly
9300      C                     ELSE
9400      C                     MOVE 'INVMID 'OVRLAY           Cont. Ovly
9500      C                     ENDIF
9600      C                     WRITEPAGEOF                   Pg 1 of 2 Msg
9700      C                     WRITEPRTOVL                   Print Overlay
9800      C                     WRITEENDPAGE                  End Page
9900      C                     WRITEINVTP2                   Next Page Header
10000     C                     Z-ADD0        ITMCNT
10100     C                     ENDIF
10200     C*
10300     C            ENDDET   TAG
10400     C*
10500     CL1          ITMCNT   IFGT 18                       No Room for PSEG
10600     CL1                   ADD  1        PAGCNT
10700     CL1                   MOVE 'INVFST 'OVRLAY  8        Lng Pg 1 Ovly
10800     CL1                   WRITEPAGEOF                   Pg 1 of 2 sg
10900     CL1                   WRITEPRTOVL                   Print Overlay
11000     CL1                   WRITEENDPAGE                  End Page
11100     CL1                   WRITEINVTP2                   Page 2 Heading
11200     CL1                   ENDIF
11300     C*
```

```
11400      CL1                    MOVE BARTOT      BARPRC 150      Load Totals
11500      CL1                    Z-ADDTOTDUE      TOTD@2  92
11600      CL1                    MOVE NAME        NAME@2 25
11700      CL1                    MOVE STREET      STRE@2 25
11800      CL1                    MOVE CITY        CITY@2 25
11900      CL1                    MOVE STATE       STAT@2  2
12000      CL1                    Z-ADDZIP         ZIP@2   90
12100      C*
12200      CL1                    EXSR OFFSR
12300      CL1          PAGCNT    IFGT 0
12400      CL1                    MOVE 'INVLST 'OVRLAY  8         Cont. Overlay
12500      CL1                    ELSE
12600      CL1                    MOVE 'INVALL 'OVRLAY            1 Page Invoice
12700      CL1                    ENDIF
12800      CL1 30                 WRITEOFFER                      Write Offer and
12900      CL1 30                 WRITEPAGSEG                     Page Segment
13000      CL1                    WRITEINVBOT                     Invoice Totals
13100      CL1                    WRITEPRTOVL                     Print Overlay
13200      CL1                    WRITEENDPAGE                    End Page
13300      CL1                    SETOF                      30
13400      C* Set up Date
13500      CSR          DATESR    BEGSR
13600      CSR                    Z-ADDUDAY        PAYDA
13700      CSR          UMONTH    ADD  1           PAYMO
13800      CSR          PAYMO     IFGT 12
13900      CSR                    Z-ADD1           PAYMO
14000      CSR          UYEAR     ADD  1           PAYYR
14100      CSR                    ELSE
14200      CSR                    Z-ADDUYEAR       PAYYR
14300      CSR                    ENDIF
14400      CSR                    MOVE PAYDAA      PAYDAT  60
14500      CSR                    Z-ADDPAYDAT      PAYDA@  60
14600      CSR                    ENDSR
14700       * Set up Offer at end of invoice
14800      CSR          OFFSR     BEGSR
14900      CSR          SLSSED    IFGE 500
15000      CSR                    Z-ADD1           IX      20
15100      CSR                    MOVE 'FLWRNB 'PSEG  8           Seed
15200      CSR                    SETON                      30
15300      CSR                    GOTO WRTOFR
15400      CSR                    ENDIF
15500      CSR          SLSFRT    IFGE 500
15600      CSR                    Z-ADD7           IX              Strawberry
15700      CSR                    MOVE 'STRWNB 'PSEG
15800      CSR                    SETON                      30
15900      CSR                    GOTO WRTOFR
16000      CSR                    ENDIF
16100      CSR          SLSSUP    IFGE 500
16200      CSR                    Z-ADD13          IX
16300      CSR                    MOVE 'TREENB 'PSEG              Tree
16400      CSR                    SETON                      30
16500      CSR                    GOTO WRTOFR
16600      CSR                    ENDIF
16700      CSR          SLSCHM    IFGE 500
16800      CSR                    Z-ADD19          IX
16900      CSR                    MOVE 'BETLNB 'PSEG             Beetle
17000      CSR                    SETON                      30
17100      CSR                    GOTO WRTOFR
17200      CSR                    ENDIF
17300      C*
17400      CSR                    GOTO ENDOFR
17500      C*
17600      CSR          WRTOFR    TAG
17700      CSR                    MOVE WDS,IX      OFFR@1 24      Build Offer Text
17800      CSR                    ADD  1           IX
17900      CSR                    MOVE WDS,IX      OFFR@2 24
18000      CSR                    ADD  1           IX
```

```
18100     CSR                  MOVE WDS,IX    OFFR@3 24
18200     CSR                  ADD  1         IX
18300     CSR                  MOVE WDS,IX    OFFR@4 24
18400     CSR                  ADD  1         IX
18500     CSR                  MOVE WDS,IX    OFFR@5 24
18600     CSR                  ADD  1         IX
18700     CSR                  MOVE WDS,IX    OFFR@6 24
18800     CSR          ENDOFR  ENDSR
18900     C*
19000       *
19100 **   WDS    WORDS FOR OFFER
19200 Thank You .....
19300 Because you have ordered
19400 over $500 of seeds this
19500 year, on your next seed
19600 order you will receive
19700 a 10% discount.
19800 Thank You .....
19900 Because you have ordered
20000 over $500 of fruit this
20100 year, on your next fruit
20200 order you will receive
20300 a 10% discount.
20400 Thank You .....
20500 Because you have ordered
20600 over $500 of trees this
20700 year, on your next tree
20800 order you will receive
20900 a 10% discount.
21000 Thank You .....
21100 Because you have ordered
21200 over $500 of stuff this
21300 year, on your next stuff
21400 order you will receive
21500 a 10% discount.
21600
                        * * * * E N D  O F  S O U R C E  * * * *
```

The RPG program shown above uses the logic described in the following sections to build the Super Sun Seeds invoices.

Beginning the Invoice

To begin the invoice, do this:
1. Read Customer Master (SEEDCUST)
2. Reset invoicing totals

Processing Items

To process the items on the invoice, do this:
1. Read records from transaction file (SEEDDETL)
2. Do item calculations
3. Write detail line using DETLIN format

Overflow Items (ITMCNT = 35)

To process overflow items, do this:
1. If page 1, use overlay INVFST
2. If page n, use overlay INVMID
3. Write PRTOVL to print overlay
4. Write INVTP2 to eject page and print continuation header

Ending the Invoice (No Room for Offer)

If there is no more room on the invoice, end it by doing this:
1. If page 1, use overlay INVFST
2. If page n, use overlay INVMID
3. Write PRTOVL to print overlay
4. Write INVTP2 to eject page and print continuation header

Ending the Invoice

If the invoice still has room left on it but it should be ended anyway, do this:
1. If page 1, use overlay INVFST or INVALL
2. If page n, use overlay INVLST
3. Select page segment image and discount offer
4. Write OFFER to print offer
5. Write PAGSEG to print image
6. Write INVBOT to print invoice total/payment coupon
7. Write PRTOVL to print overlay

Referring again to the DDS printer specifications for the new Super Sun Seeds application, the special functions can be summarized in each print record as follows:

INVTOP All program fields are printed in the default font (Courier). The 9-digit zip code is printed in postal bar code. The ship to and bill to lines use standard (based on 6 LPI) spacing and skipping. No exact positioning (down and across) is done.

INVTP2 Continuation header is printed, again with standard skipping and spacing.

DETLIN Detail lines are printed in Courier at 10 lines per inch.

INVBOT Payment coupon is printed. A field containing the customer number and total amount due is printed in Interleaved 2 of 5 bar code.

OFFER The special discount offer is printed in FONT(92), or Courier Italic 12-pitch.

PAGSEG The program passes the page segment name (based on customer sales data), and the page segment is printed 7.0 inches down and 2.6 inches across the page.

PRTOVL The program passes the appropriate overlay in the OVRLAY field, and it is printed at 0 inches down and 0 inches across the page.

Enhancing the Super Sun Seeds Invoice

The Super Sun Seeds invoice is an effective business document, making use of electronic forms, bar codes, custom images and marketing messages. Because it is an electronic document, it easily can be updated or changed.

A number of enhancements to the Super Sun Seeds invoicing application can significantly add to its value as a document:

- A standard set of terms and conditions can be printed on the back side of selected pages. This is called a constant back form or overlay.
- A set of collated copies of the invoice can be automatically produced. A packing list and a file copy, for example.
- The information about the copies can be tailored. For example, pricing information about the packing list can be suppressed.

- The variable positioning capabilities of DDS can be used to create a dynamic or "floating" invoice, one in which the form itself is tailored exactly to customer data.

Two additional Super Sun Seeds invoice examples, INVNEW2 and INVNEW3, demonstrate how to add the functions described above. INVNEW2 implements the copies, price suppression, and constant back overlay. INVNEW3 adds the dynamic, or floating, form. The RPG and DDS source for INVNEW2 and INVNEW3, as well as the output for both examples can be found in Appendix B, "Additional DDS Examples," on page 257.

The following sections show how the enhancements described above were made.

Specifying Constant Back Overlays

An invoice or similar document might need a set of instructions or terms and conditions printed on the back side. This cannot be done with the BACKOVL parameter of the printer file because it cannot force the required page eject. For the Super Sun Seeds application, simply use the PRTOVL record format to print the back side overlay and add the ENDPAGE keyword to force the page eject. A sample of the terms and conditions form (INVBAC) is shown in Figure 40 on page 110.

Specifying Copies

A typical invoicing application requires more than just the customer copy of the bill. Copies of the invoice, such as a packing list, a file copy, and an accounting copy are common. In addition, the paper workflow might require that the copies are either collated or uncollated.

For uncollated copies, the easiest technique is to run the application multiple times, creating a separate spooled file for each copy. The application runs could be tailored to use different overlays for the different copies, or to simply print the copy designation (for example, **Packing List**) in text at the bottom of each copy.

Collated copies normally require saving some of the invoicing information in order to print the multiple copies at either a page or invoice break. Because electronic printing is page-mode printing, you need to save the page contents to reprint the page as a copy.

Figure 57 on page 162 shows a sample of the "Customer Copy", one of three copies created in sequence by INVNEW2.

Figure 57. Customer Copy - INVNEW2

Just as the electronic forms for Super Sun Seeds have been tailored to match the incoming data, so likewise can the copies be tailored. For example, you can specify that one copy of the invoice is to be used as a packing list, and suppress the price information.

Figure 58 on page 163 shows a sample of the Super Sun Seeds packing list.

```
       400 CPU Parkway                                      Office: 555-499-2367
       Vegetation, NJ  55090      SUPER SUN SEEDS.com        Fax:   555-415-9794

┌                           ┐    ┌              ┐    ┌                           ┐
     IMPROVED PRINTING CORP
     PERFORMANCE BOULEVARD
     PRINTERSVILLE
     CO  45789-2637
└                           ┘    └              ┘    └                           ┘
              -- Sold To --                              -- Ship To --

 Customer              Invoice            Invoice              Payment
 Number:    100        Number:   31300    Date:    3/13/02     Date:    4/13/02

 Ship Via: BEST WAY  Ship Date: 3/13/02  Terms: NET 30  Rep: YOUR PRINTER REP
```

Qty	UOM	Item #	Item Description	Price	Extension
1	PK	01100517	SPARTAN SEEDS		
9	PK	04569870	NORTHERN LITE BLUE SPRUCE		
12	BX	11005004	BUSH GREEN SEEDS		
12	CT	11005011	LASSO RED SEEDS		
26	PK	11005018	EARLY BANTAM SEEDS		
5	BX	11057893	AFRICAN DAISY, SEEDS		
1	PK	15975365	HEAVY OAK		
33	BX	32746510	HOPS BREWING LIGHT		
6	EA	46578913	SEED SURVEYING SITE		
2	BX	56412113	POT POT		
80	PK	65412384	SEED SCRUBBER		
1	PK	84512023	OREGON SPRING TOMATO SEED		
2	DZ	96325874	PINEAPPLE-ORANGE SEED		
11	BX	98412006	BLACK BEAUTY ZUCCHINI		
5	EA	98546320	FROZEN JUICE PROCESSOR		
1	CT	00000300	HIGH ALTITUDE WATERMELON		

Thank You . . . . .
Because you have ordered
over $500 of seeds this
year, on your next seed
order you will receive
a 10% discount.

This invoice overlay designed using IBM AFP Utilities/400   Total Due

----

Return this tear-off strip with your payment.   *Make Checks Payable to:*   ***Super Sun Seeds***
Payment is due by: 4/13/02   Amount Due is:

```
   IMPROVED PRINTING CORP
   PERFORMANCE BOULEVARD
   PRINTERSVILLE
   CO  457892637
```

                              Packing List   Page 1

Figure 58. Super Sun Seeds Packing List

Chapter 16. Using Infoprint Designer

Infoprint Designer (product number 5733–ID1) is an iSeries licensed product for transforming existing application output to advanced electronic documents. Infoprint Designer helps you transform applications such as those that use preprinted forms with *LINE or *SCS data to full-function electronic documents. Because Infoprint Designer builds on the integrated page architecture of the iSeries, the document design and reengineering can be accomplished without changes to the line of business application program. In this chapter we describe Infoprint Designer and its components, then show how you can use it to create an application solution to the Super Sun Seeds case study.

Overview

Infoprint Designer provides a fully-graphical document composition interface to the iSeries printing and e-output system. It supports the requirements of today's complex documents and reports, producing fully electronic documents that combine data, text, overlays, graphics, images, bar codes, and typographic fonts. You can use Infoprint Designer to design new output applications or re-engineer existing applications.

Infoprint Designer consists of three components:

- **Infoprint Overlay Editor** for design of overlays (electronic forms).
- **Infoprint Image Editor** for design of images (iSeries page segments).
- **Infoprint Layout Editor** for design and placement of application data as well as formatting the other page elements (overlays, images).

Infoprint Designer can seamlessly retrieve current application data (spooled files) for you to use in your design, then upload all component resources to the i5/OS so the application can be put into production without application changes.

In the background, Infoprint Designer defines the format of pages with page definition and form definition resource objects. Unlike DDS, these resources are application-independent, although they are compatible with applications that define output data with DDS. i5/OS will automatically write these applications as full AFP, which ensures viewing and PCL support.

illustrates how Infoprint Designer integrates with the iSeries. Before implementing a new application template, the iSeries application produces a simple SCS or line data spooled file. The printer file that is used by the application determines the format of this spooled file. With Infoprint Designer, you seamlessly download application output data into Infoprint Designer, design images and overlays, and merge the data into a completed document. Next, you upload your overlays, images, bar codes, fonts and the Infoprint Designer-created page definition and form definition to i5/OS. In order to put them production, you add references to the page definition and form definition to the printer file. The next time the application runs, instead of producing simple SCS or line data, it produces fully graphical AFP.
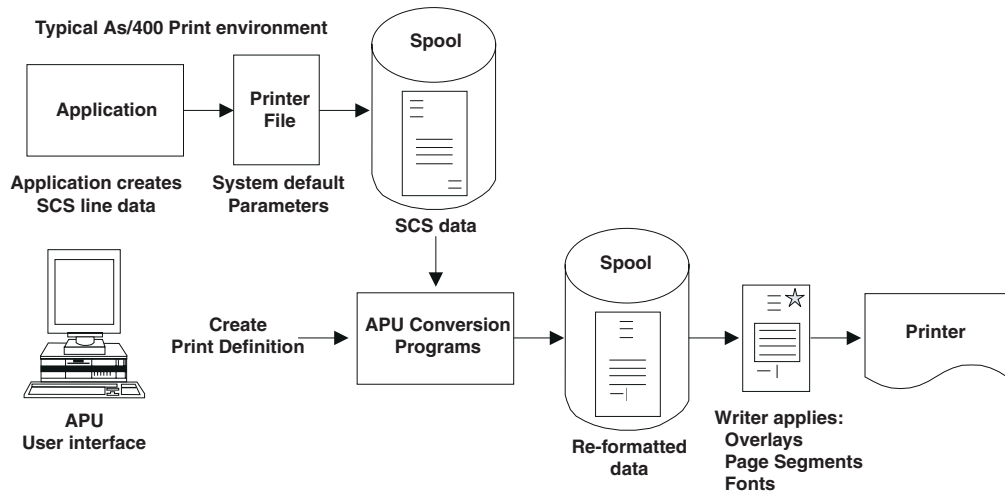
Figure 59. Infoprint Designer Application Flow

For more information about Infoprint Designer, including a detailed example and instructions about advanced use of the product, refer to the Redbook *IBM @server iSeries Printing VI: Delivering the Output of e-business* or *Infoprint Designer for iSeries: Getting Started*.

What You Can Do with Infoprint Designer

Output specifications for iSeries application programs generate SCS, line, or AFP spooled files. Infoprint Designer takes SCS or line data spooled files and creates page definitions, form definitions, and overlays for use with line data files. SCS is a line-oriented data stream that typically uses preprinted forms to create the final document. For these types of output applications, Infoprint Designer eliminates the need for preprinted forms. With Infoprint Designer, you can:

- Create multi-copy documents, with each page or copy customized. Infoprint Designer provides a Wizard to make this simple.
- Use data that is contained within a page to determine page formatting.
- Re-map any field that the input pages contain. For example, you can change the position, font, orientation, and color.
- Add and edit images to application documents.
- Print application data in any of the standard bar code symbologies.
- Add document elements such as overlays, images, lines, boxes, and constant text.
- Place a new application into production for automatic processing without changes to the underlying application.
- Create complex, fully graphical documents that can be used in "downstream" processes such as PDF presentation, e-mail, fax, and printing.

Many of these capabilities are illustrated in "Super Sun Seeds Case Study" on page 169.

Overlay Editor

The Infoprint Overlay Editor is a component of Infoprint Designer for graphically designing electronic forms (overlays). The Overlay Editor includes these functions:

- Display and edit multiple overlays per project
- Create lines, boxes, circles in multiple styles
- Create shaded or rounded box elements
- Place text standalone or within a defined region with justification options
- Duplicate and repeat functions; undo and redo changes
- Import TIFF images "on-the-fly" into the document (and into page segment format)
- Import existing AFP overlays
- Scan an image of an existing preprinted form to use as a template for design
- Align overlay elements with the autoalign feature
- Work without worry by using the autosave feature

Figure 60 shows the Overlay Editor with an overlay opened in it.
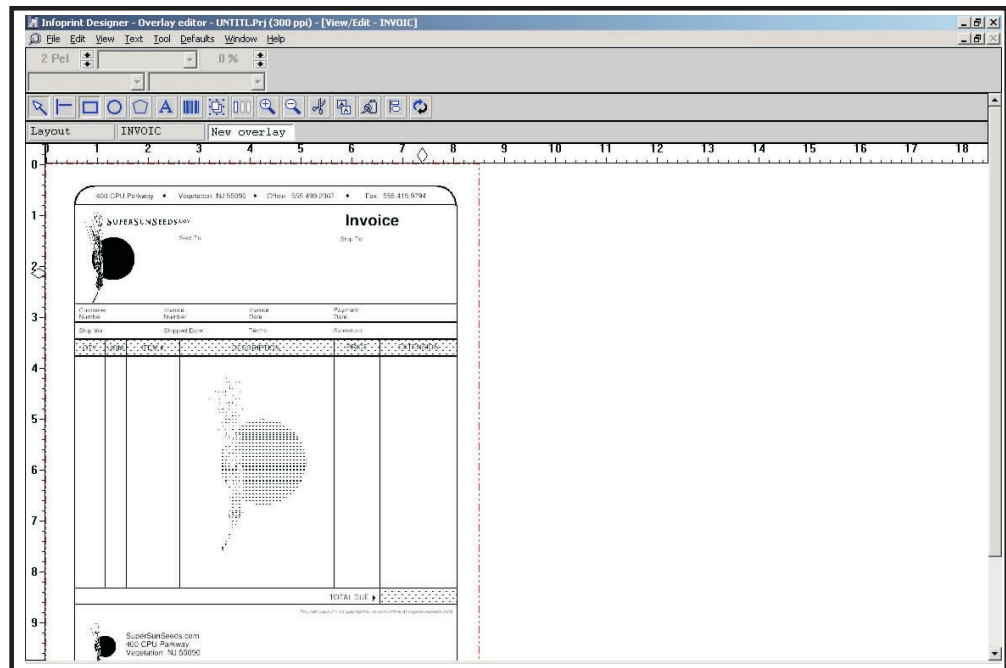
Figure 60. Overlay Editor

Image Editor

The Infoprint Image Editor is the component of Infoprint Designer for image design and conversion. With the Image Editor you can:

- Create sharp, high-fidelity images
- Edit images in native iSeries format
- Import TIFF images
- Touch-up images professionally using the toolkit of image editing tools
- Edit image a pel level for precise control
- Enter text within the image

- Rotate image in 1-degree increments
- Rescale, resize, cut, paste, crop, invert, shade, flip, and mirror the image
- Preview the image
- Create or edit an image in full color, including the latest FS45 color image specification

Figure 61 shows the Image Editor with the Super Sun Seeds logo displayed.
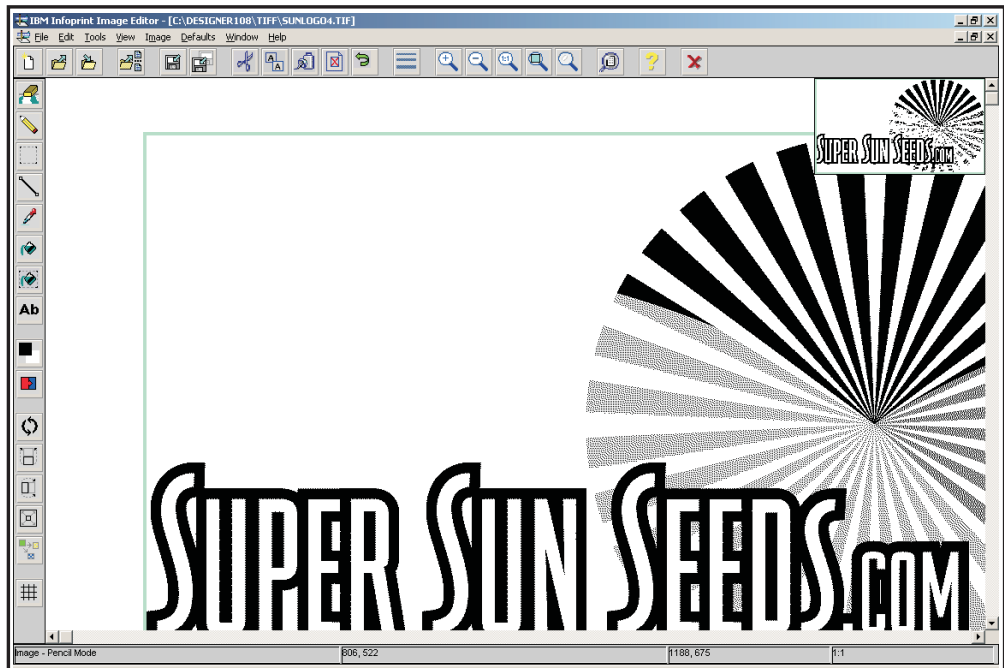
Figure 61. Super Sun Seeds Logo Scanned into the Image Editor

Layout Editor

The Layout Editor is the central design component of Infoprint Designer. It lets you merge the data from i5/OS spooled files with overlays, images, bar codes, and fonts - creating the iSeries template for the desired fully graphical document. You can then upload the whole project to the i5/OS and use it in production. The Layout Editor includes these functions:

- iSeries Access integration for download of application output data and upload of completed projects
- Easy drag-and-drop manipulation of application data
- Fully graphical page preview, you see what will print
- Ability to browse and select target print file
- Separate graphical windows for programmer designers
- Full conditional processing – page layout is based on test of page data
- Design wizard for ease in designing more complex document applications
- Full implementation of iSeries page (AFP) architecture
- Seamless, full integration into iSeries output architecture

Figure 62 shows the Layout Editor window. An overlay with no data on it is in the left pane. The data that is going to be placed on the overlay is displayed in the right pane.
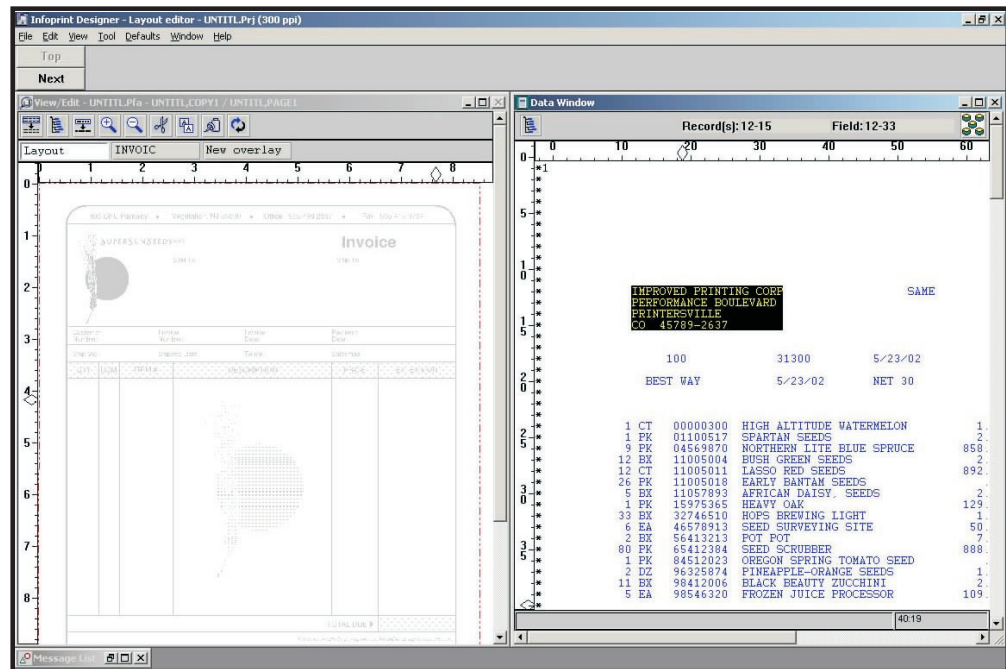
Figure 62. Layout Editor Window

Starting in version 1.11 (provided with PTFs SF67603 and SF67604), Infoprint Designer comes with a Layout wizard, which makes it easier for you to create complex layouts in the Layout Editor. To use the wizard, design your first output page then select the wizard icon: from the toolbar. The wizard lets you specify how the next output page is different from the first one, helping you create a modified copy of the first page (with different overlays or suppressed data, for example) or to change layouts based on a trigger in the data file. You can use the wizard as many times as you need to in a project to design all of the different layouts you need for a print job.

Super Sun Seeds Case Study

In this section we apply Infoprint Designer to the Super Sun Seeds case study. We will use Infoprint Designer to create a redesigned output application using standard iSeries page resources (overlays, page segments, fonts, page definitions, and form definitions).

Applying Infoprint Designer to the Super Sun Seeds case study is a simple, straightforward application. As explained in Chapter 13, "Introduction to the Super Sun Seeds Case Study," on page 125, the existing Super Sun Seeds invoicing application prints on a preprinted invoice. The data to be printed, shown in Figure 63 on page 170, is produced by program INVSCS.

```
IMPROVED PRINTING CORP                    SAME
PERFORMANCE BOULEVARD
PRINTERSVILLE
CO  45789-2637
        100            31300       1/26/02          2/26/02
      BEST WAY          1/26/02       NET 30        YOUR PRINTER REP

  1 CT   00000300  HIGH ALTITUDE WATERMELON     1.01          1.01
  1 PK   01100517  SPARTAN SEEDS                2.39          2.39
  9 PK   04569870  NORTHERN LITE BLUE SPRUCE  858.32      7,724.88
 12 BX   11005004  BUSH GREEN SEEDS             2.50         30.00
 12 CT   11005011  LASSO RED SEEDS            892.23     10,706.76
 26 PK   11005018  EARLY BANTAM SEEDS            .38          9.88
  5 BX   11057893  AFRICAN DAISY, SEEDS         2.35         11.75
  1 PK   15975365  HEAVY OAK                  129.09        129.09
 33 BX   32746510  HOPS BREWING LIGHT           1.20         39.60
  6 EA   46578913  SEED SURVEYING SITE         50.00        300.00
  2 BX   56413213  POT POT                      7.65         15.30
 80 PK   65412384  SEED SCRUBBER              888.79     71,103.20
  1 PK   84512023  OREGON SPRING TOMATO SEED     .97           .97
  2 DZ   96325874  PINEAPPLE-ORANGE SEEDS       1.29          2.58
 11 BX   98412006  BLACK BEAUTY ZUCCHINI        2.30         25.30
  5 EA   98546320  FROZEN JUICE PROCESSOR     109.90        549.50

                              Thank You .....
                              Because you have ordered
                              over $500 of seeds this
                              year, on your next seed
                              order you will receive
                              a 10% discount.
                                                    $90,652.21


            2/26/02                               $90,652.21
  IMPROVED PRINTING CORP
  PERFORMANCE BOULEVARD
  PRINTERSVILLE
  CO  457892637
```

Figure 63. The SCS File to be Formatted

Infoprint Designer is used to transform the output of INVSCS to an electronic invoice. The formatted output that we want to produce is shown in Figure 64 on page 171.

Invoice

400 CPU Parkway   Vegetation, NJ 55090   Office: 555-499-2367   Fax: 555-415-9794

SUPERSUNSEEDS.COM

Sold To

IMPROVED PRINTING CORP
PERFORMANCE BOULEVARD
PRINTERSVILLE
CO 45789-2637

Ship To

SAME

| Customer Number: | 100 | Invoice Number: | 31300 | Invoice Date: | 7/17/02 | Payment Date: | 8/17/02 |

Ship Via: BEST WAY   Shipped Date: 7/17/02   Terms: NET 30   Rep: YOUR PRINTER REP

Qty	UOM	Item	Item Description	Price	Extension
1	CT	00000300	HIGH ALTITUDE WATERMELON	1.01	1.01
1	PK	01100517	SPARTAN SEEDS	2.39	2.39
9	PK	04569870	NORTHERN LITE BLUE SPRUCE	858.32	7,724.88
12	BX	11005004	BUSH GREEN SEEDS	2.50	30.00
12	CT	11005011	LASSO RED SEEDS	892.23	10,706.76
26	PK	11005018	EARLY BANTAM SEEDS	.38	9.88
5	BX	11057893	AFRICAN DAISY, SEEDS	2.35	11.75
1	PK	15975365	HEAVY OAK	129.09	129.09
33	BX	32746510	HOPS BREWING LIGHT	1.20	39.60
6	EA	46578913	SEED SURVEYING SITE	50.00	300.00
2	BX	56413213	POT POT	7.65	15.30
80	PK	65412384	SEED SCRUBBER	888.79	71,103.20
1	PK	84512023	OREGON SPRING TOMATO SEED	.97	.97
2	DZ	96325874	PINEAPPLE-ORANGE SEEDS	1.29	2.58
11	BX	98412006	BLACK BEAUTY ZUCCHINI	2.30	25.30
5	EA	98546320	FROZEN JUICE PROCESSOR	109.90	549.50

Thank You . . . . .
Because you have ordered
over $500 of seeds this
year, on your next seed
order you will receive
a 10% discount.

Total Due ▶ $90,652.21

You can save 2% by paying this invoice online at superseeds.com

SuperSunSeeds.com
400 CPU Parkway
Vegetation, NJ 55090

Page 1

Figure 64. Super Sun Seeds Invoice

To do this, we will break down the design project into these tasks:

- Specify only one page format, the basic invoice page.
- Select a sample spooled file.
- Specify general page layout options, using data in the spooled file.
- Place the INVOIC overlay on front.

Before you begin - optional:

If you have Infoprint Designer installed, you can duplicate the case study solution that is illustrated in this chapter. In order to do this, make sure that these setup steps are done:

- Ensure that you have version 1.11 of Infoprint Designer.
- Infoprint Designer comes with a demonstration library called IPDATA that includes sample tools to use on your iSeries server. If you want to use the sample data, follow these steps:
  1. Install the IPDATA library on your iSeries.
  2. Add IPDATA to your library list using the command: ADDLIBLE IPDATA.
  3. Issue the command INV (accept the default parameters) to create a spooled file called INVSCS on your current output queue for use with this example.

For more information about installing and using the IPDATA sample application library, refer to *Infoprint Designer for iSeries: Getting Started*.

Steps to create the Super Sun Seeds electronic invoice:

1. When you start Infoprint Designer, it opens with the Overlay Editor started so you can begin creating an overlay. You will draw your overlay in the **View/Edit** window, shown in Figure 65.
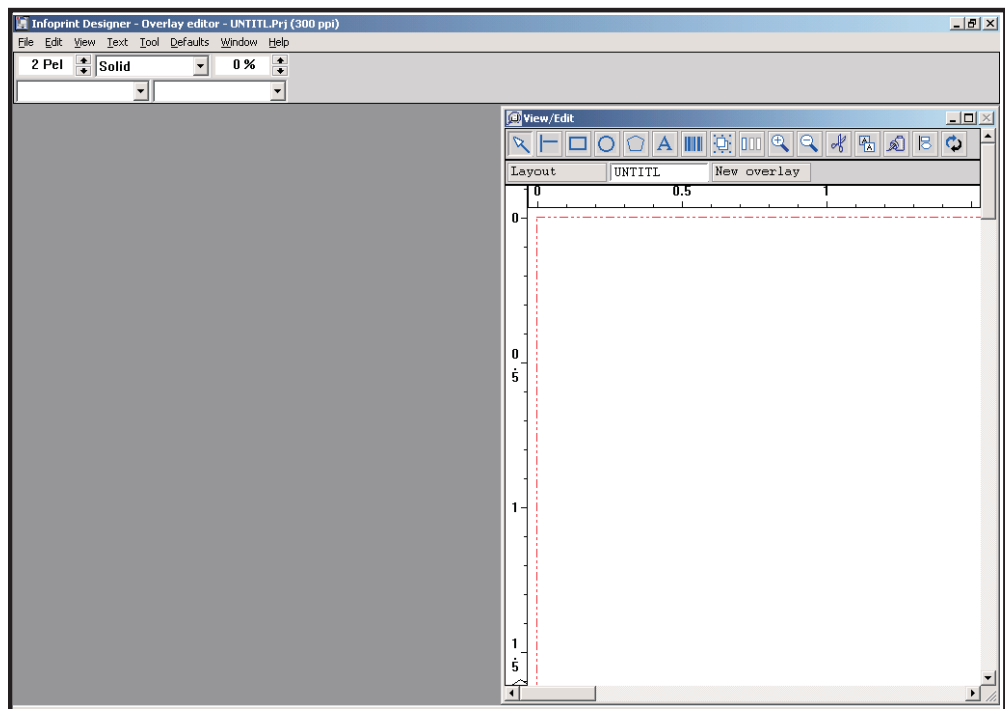
Figure 65. New Project

To help you place overlay elements, ensure that you have an appropriate grid defined and that Snap to grid is on.

- To specify the grid size and units, from the **Edit** menu, select **Preferences**. Use the **Units and Grid** page to specify how you want your grid.
- To turn on and off the Snap to grid feature, from the **View** menu, select or deselect **Snap to Grid**.

The default values for the grid are acceptable for the Super Sun Seeds sample project, so we will not change them.

2. We will start by drawing the outermost box in the overlay. Select the Box drawing tool: Draw a box with the upper left-hand corner .4 in down from the top and .5 in from the left edge. The **X** and **Y** fields in the toolbar show the distance from the left and top edges, respectively. Make the box 7.5 in wide and 10.25 in. tall. The **W** and **H** fields in the toolbar show the width and height of the box you are creating.

   Note: The units shown in the toolbar are, by default, the units specified for your grid. You can change these units from the **Preferences** dialog. Alternatively, you can change the units on the toolbar after drawing something on the page.
   You should see a large rectangle in the overlay.

3. To round the corners of the box, right-click anywhere on the border of the box. The **Box properties** dialog appears. Select the **Rounding** page, as shown in Figure 66 on page 173. Under Rounded corners, select **All** and make sure

the Rounding size is set to MEDIUM. Click **OK** and the box now has rounded corners on the overlay.
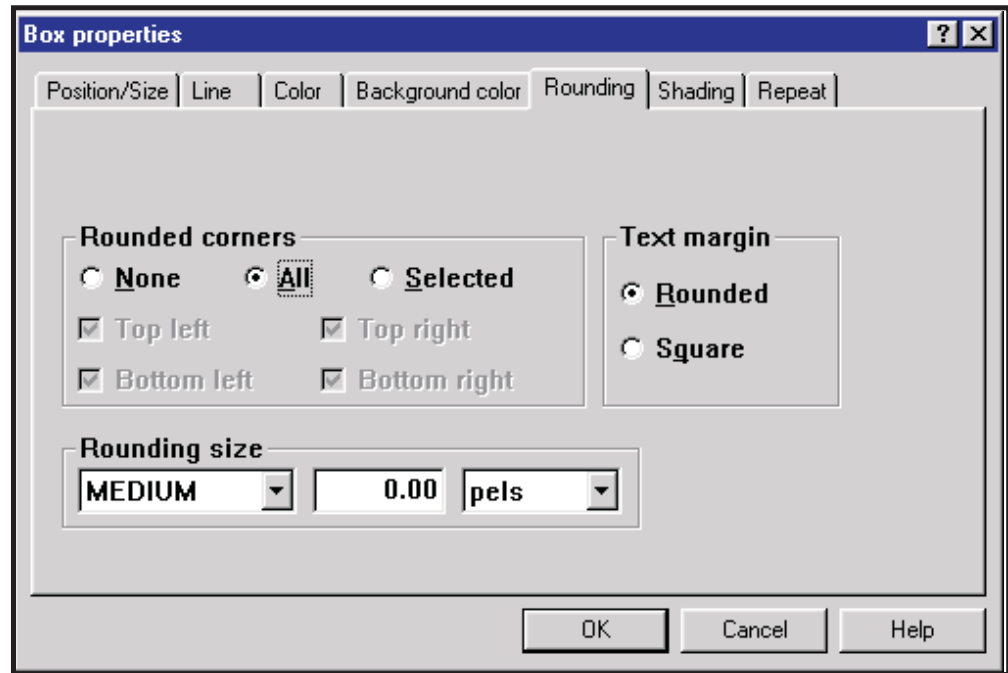
Figure 66. Box Properties Dialog - Rounding Page

4. Next we will add a line inside the box. We will add the one that appears beneath the company logo and above the row starting with Customer Number. Select the Line drawing tool: Draw a line starting at X = .55 inches and Y = 2.75 inches and connecting to the right side of the box. The **L** field in the toolbar should show that the line is 7.5 inches long.

   To make sure that the line is attached to the left edge of the box, select the line and the box border. To select multiple objects, select the first one then hold down **Shift** while you select the rest. Both elements should now be surrounded with a thin blue rectangle. Next, select the **Align** tool: The **Align objects** dialog is displayed. Select the picture that shows left alignment and click **OK**.

5. Notice there is another line beneath the text "Customer Number". Create that line by repeating the line you just drew. Select the line and then click the Repeat tool: . On the **Repeat** page, select **Repeat manually** then select **Place**. Place the new line at X = .55 in. and Y = 3.25 in.

6. To enter the text block "Customer Number," select the Text tool: Starting at X = .65 inches and Y = 2.90 inches, draw a box with a width of 1.2 inches (use the ruler at the top to approximate the width) and a height tall enough to fit between the two lines you drew. When you release the mouse button, the **Select font** dialog is displayed, as shown in Figure 67 on page 174.

   After selecting a typeface (such as Helvetica), choices are made available for size, weight/width/design, and code page. Select a value for each of these

font attributes; for this example use "Helvetica 10 point", "Medium/medium/normal" and "USA/Canada - CECP". Click **OK**.

Type **Customer Number**. When you type the N in Number, the text wraps onto the next line. Press **Esc** when you are done entering text.
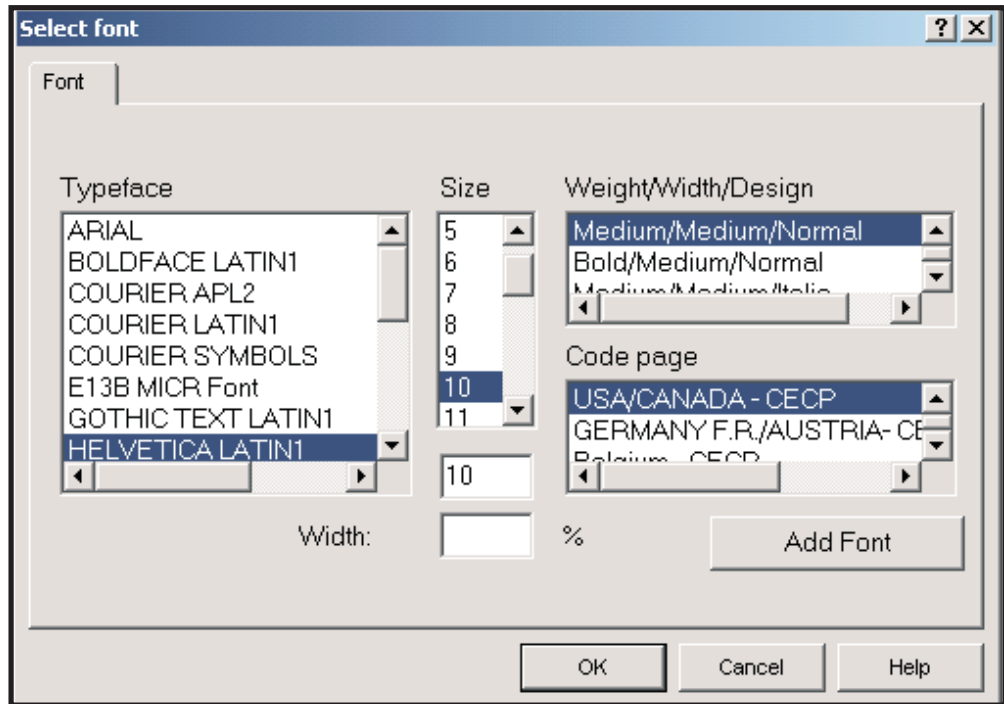
Figure 67. Select Font Dialog

7. Now we will retrieve the Super Sun Seeds logo, which is stored as an AFP page segment. Click **File** and select **Get image**. Browse to the Designer\PSEG300 directory and select the file named **SS2TOP.300** and click **OK**. The selected image appears at the upper left corner. You can drag the image anywhere you want it in the overlay. We placed the logo at X=.5 inches, Y=.7 inches.

8. You can create the remaining objects in the overlay using the techniques described in steps 2 - 7. To save your work on the overlay, click **File** and select **Save as** and name the project. The same name will be given to the overlay file by default.

9. Now you are ready to begin mapping data. To open the Layout Editor, click the **Layout** button on the View/Edit toolbar. The **Get sample data - Select source** dialog opens. If you installed the IPDATA INV invoice application on your iSeries and created a sample spooled file, select **From AS/400**. If you want to use the PC version of the sample file shipped with Infoprint Designer, select **From PC**. Click **OK**.

The **Get sample data** dialog is displayed where you can select the name of the output queue containing the spooled file. The spooled files in that output queue are then displayed so you can select the desired spooled file, as shown in Figure 68 on page 175. Select the file named INVSCS that you created earlier and then provide a name for the backup data file on the PC.

If you are getting the data from your PC, in the **Get sample data** dialog, browse to **Designer\Data** and open **Invscs.asc**.
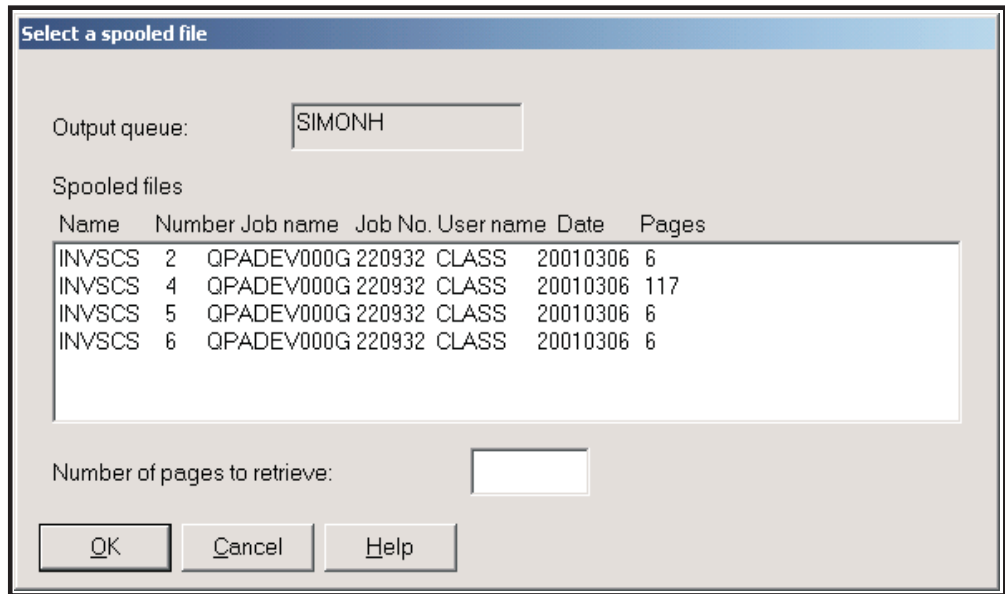
Figure 68. Selecting the Spooled File

10. After the spooled file is selected, the **Layout properties** dialog opens, as shown below. Here you can specify the page size (Letter, in this case), orientation (portrait), and sides (simplex).
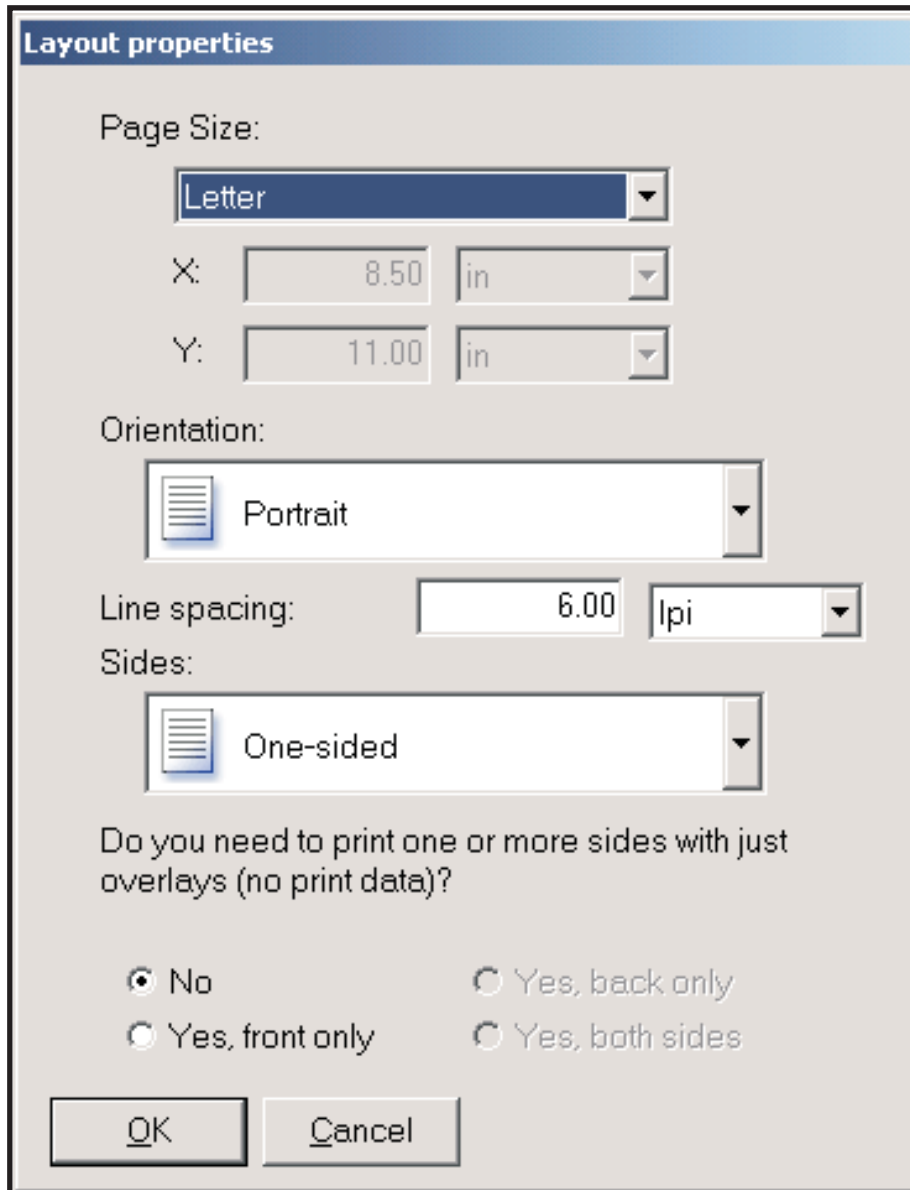
Figure 69. Layout Properties Dialog

Click **OK** and your Designer window should look like Figure 70 on page 177. You might need to click **Window** and select **Data** to open the Data window.

Infoprint Designer - Layout editor - UNTITL.Prj (300 ppi)

File Edit View Tool Defaults Window Help

Top

Next

Data Window

Record(s):   Field:

```
0    0        10        20        30        40        50
 0
  *1
  *
  *
  *
5 *
  *
  *
  *
  *
1 *
0 *
  *
  *              IMPROVED PRINTING CORP              S.
  *              PERFORMANCE BOULEVARD
  *              PRINTERSVILLE
1 *              CO   45789-2637
5 *
  *
  *                     100            31300          4/04/0
  *
2 *              BEST WAY            4/04/02          NET 30
0 *
  *
  *
  *              1 CT    00000300   HIGH ALTITUDE WATERMELON
2 *              1 PK    01100517   SPARTAN SEEDS
5 *              9 PK    04569870   NORTHERN LITE BLUE SPRUCE
  *              12 BX   11005004   BUSH GREEN SEEDS
  *              12 CT   11005011   LASSO RED SEEDS
  *              26 PK   11005018   EARLY BANTAM SEEDS
  *              5 BX    11057893   AFRICAN DAISY, SEEDS
```

3:15

View/Edit - UNTITL.Pfa - UNTITL,COPY1 / UNTITL,PAGE1

Layout   INVOIC   New overlay

```
0       0.5        1        1.5        2        2.5
```

SUPERSUNSEEDS.COM

Customer
Number:

Figure 70. Spooled File Displayed in the Data Window

11. To begin mapping data, hold down the left mouse button and select the entire address block. Right-click (and hold down) anywhere inside the selected block and drag the text over to the **View/Edit** window until you have the address positioned at X = 2.5 in (or 600 pels), Y = -.25 in. (or -60 pels). Figure 71 on page 178 shows the data being positioned in the **View/Edit** window. You can see the X and Y coordinates at the top, right-hand corner of the screen.
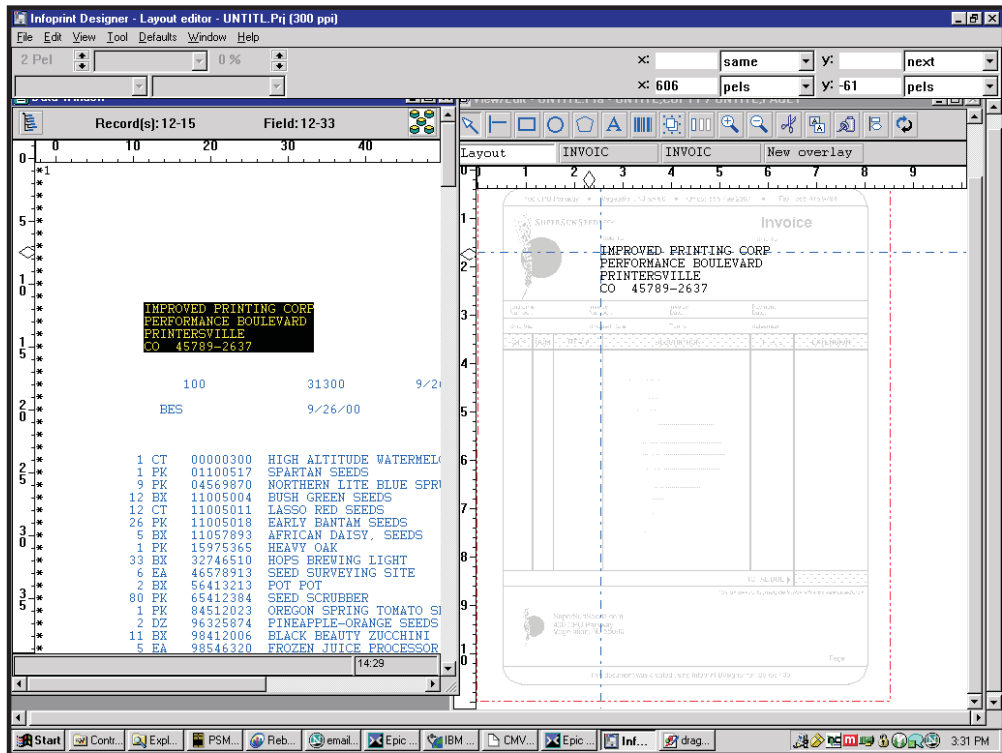
Figure 71. Positioning Text in the View/Edit Window

To change the font for the address block, right-click anywhere in the field. The **Field properties** dialog opens. On the **Font** page, select the same font attributes you used for the text in the overlay (10-point Helvetica, medium, USA/CANADA). Click **OK**. The font is changed in the **View/Edit** window.

12. To map the zip code as a bar code, select the first five digits of the zip code in the data window. Drag the data onto the **View/Edit** window and place it beneath the address block. Right-click it to open the **Field properties** dialog.

Click the **Bar code** button on the **General** page to open the **Bar code options** dialog, as shown in Figure 72 on page 179. Enter a name for this type of bar code (for example, POST), then select POSTNET as the bar code type and click **OK**.

Click **OK** on the **Field properties** dialog and you should see the zip code shown in Postnet bar code in the **View/Edit** window.
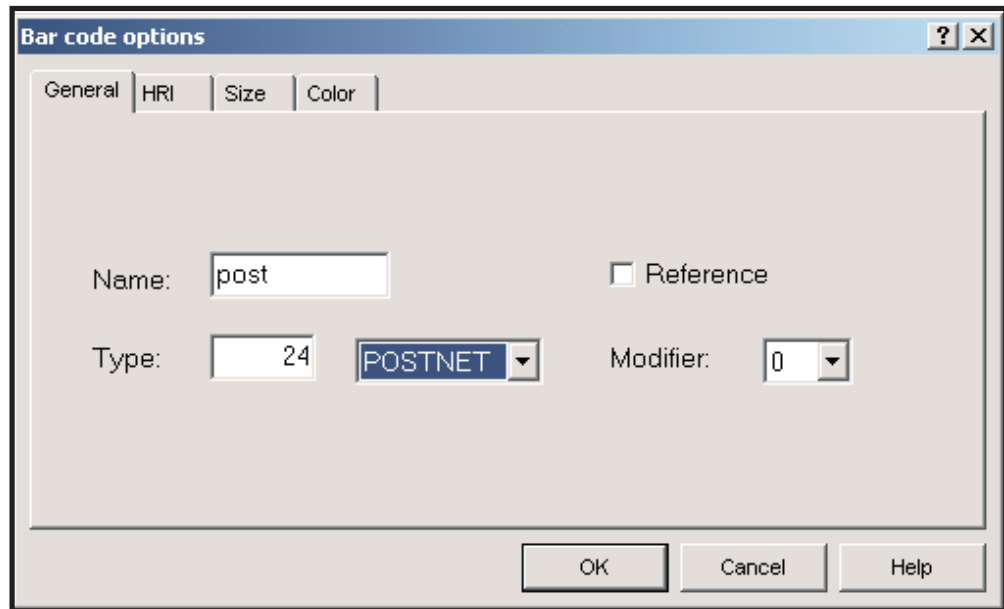
Figure 72. Bar Code Options Dialog

13. Although we did not complete the column headings in the overlay, experiment with mapping the invoice detail lines as a block. In the **Data** window, select columns 10 through 80 on records 24 through 42 (starting at the top left corner of the data you want to select). Drag the selected block to the **View/Edit** window and drop it under the second line we drew on the overlay. Notice that you can select the first record in the group and move the entire group of records for finer positioning. You can also select the bottom row of the group and then drag it down to change the interline spacing of all of the lines in that group.

14. If you find that the overlay does not allow enough room to place some data, click on the name of the overlay in the tabs in the **View/Edit** window to toggle from the Layout Editor to the Overlay Editor. Notice that the overlay comes into the foreground (text and graphical elements turn black) and the mapped data goes into the background (turns gray). You can now edit the overlay; lengthening a line or stretching a box with the mapped data there to guide you. When the overlay has been corrected, click the **Layout** tab and you toggle back to the Layout Editor.

15. After you map all of the data onto the overlay, as shown in Figure 73 on page 180, save the project and upload it to the iSeries. To save the project, click **File** and select **Save project**.
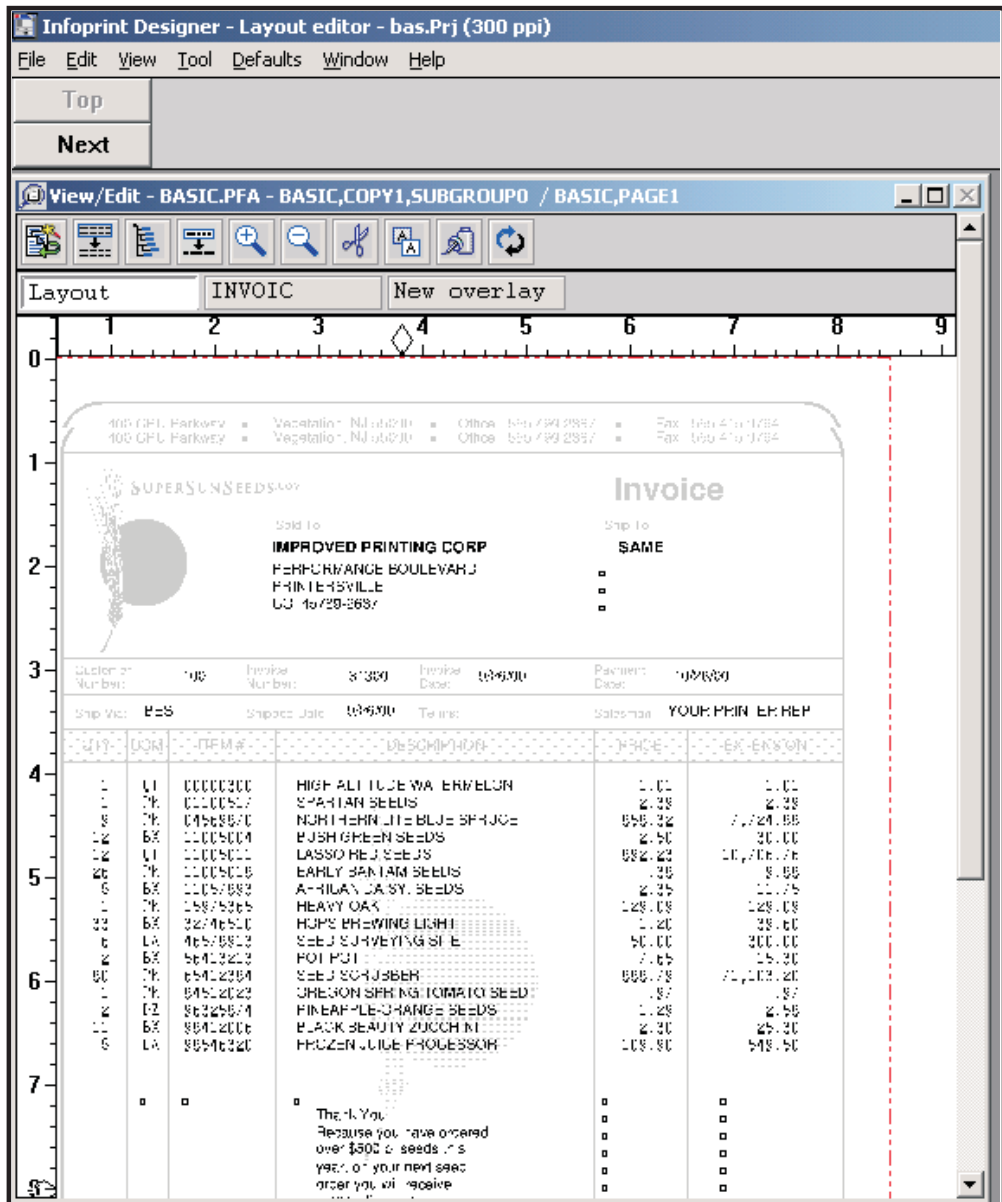
Figure 73. Finished Overlay with Data

16. To upload the project to the iSeries, click **File** and select **Upload to AS/400**.

    The **Upload to AS/400** dialog opens. On the **Contents** page, select **Whole project** so that all the project resources (overlays, images, page definition, and form definition) that have been created based on your design will be uploaded and compiled. Open the **AS/400** page to verify your connection information, as shown in Figure 74 on page 181. Ensure that **Page segments** is selected so the Super Sun Seeds logo file is sent to your system as well as the resources you created. Click **OK**. A series of messages show the file transfer status.
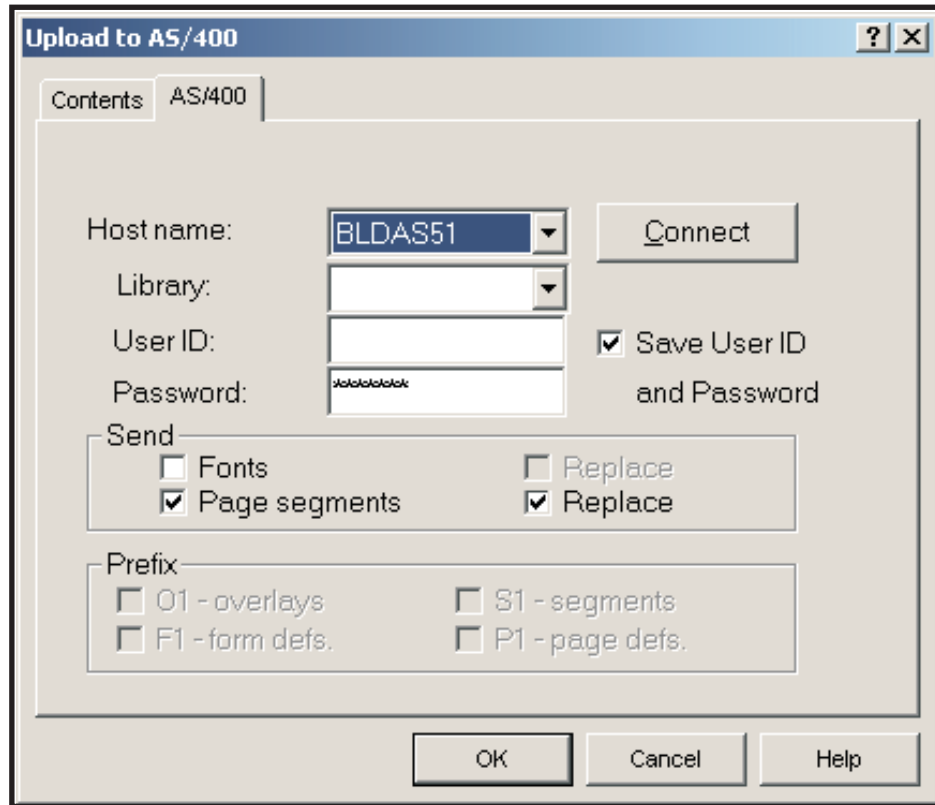
Figure 74. Upload to AS/400 Dialog, AS/400 Connection Page

17. Override your printer file to specify the form definition and page definition and specify a device type of *LINE. To change your printer file for the current session and user, enter this command, where *pagedef* and *formdef* are the page definition and form definition you created with Infoprint Designer (they have the same name as your project). *printer-file* is the printer file your application uses.

    ```
    OVRPRTF FILE(printer-file) DEVTYPE(*LINE) PAGDFN(pagedef) FORMDF(formdef)
    ```

    To use the i5/OS panels, enter OVRPRTF and press F4. Specify the printer file's name and specify *LINE for Printer device type, as shown below:

```
                        Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 File being overridden  . . . . . >  seeds           Name, *PRTF
 Overriding to printer file . . .    *FILE           Name, *FILE
   Library  . . . . . . . . . . .                    Name, *LIBL, *CURLIB
 Device:
   Printer  . . . . . . . . . . .                    Name, *SYSVAL, *JOB
 Printer device type  . . . . . .    *LINE           *SCS, *IPDS, *USERASCII...
 Page size:
   Page length  . . . . . . . . .                    .001-255.000
   Page width . . . . . . . . . .                    .001-378.000
   Measurement method . . . . . .    *ROWCOL         *ROWCOL, *UOM
 Lines per inch . . . . . . . . .                    3, 4, 6, 7.5, 7,5, 8, 9, 12
 Characters per inch  . . . . . .                    5, 10, 12, 13.3, 13,3, 15...
 Front margin:
   Offset down  . . . . . . . . .                    0-57.790, *DEVD
   Offset across  . . . . . . . .                    0-57.790

                                                                  More...
 F3=Exit   F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display       F24=More keys
```

Figure 75. Override with Printer File - First Screen

Page through the screens until you can specify the page definition and form definition:

```
                        Override with Printer File (OVRPRTF)

 Type choices, press Enter.

 Font character set:
   Character set  . . . . . . . .                    Name, *FONT
     Library  . . . . . . . . . .    *LIBL           Name, *LIBL, *CURLIB
   Code page  . . . . . . . . . .                    Name
     Library  . . . . . . . . . .    *LIBL           Name, *LIBL, *CURLIB
   Point size . . . . . . . . . .    *NONE           0.1-999.9, *NONE
 Coded font:
   Coded font . . . . . . . . . .                    Name, *FNTCHRSET
     Library  . . . . . . . . . .    *LIBL           Name, *LIBL, *CURLIB
   Point size . . . . . . . . . .    *NONE           0.1-999.9, *NONE
 Page definition  . . . . . . . .    sunseeds        Name, *NONE
   Library  . . . . . . . . . . .    *LIBL           Name, *LIBL, *CURLIB
 Form definition  . . . . . . . .    sunseeds        Name, *NONE, *DEVD
   Library  . . . . . . . . . . .    *LIBL           Name, *LIBL, *CURLIB
 AFP Characters . . . . . . . . .                    Name, *NONE
             + for more values
                                                                  More...
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 76. Override with Printer File - Specifying the Page Definition and Form Definition

For the IPDATA sample application, you can alternatively use the INV command instead of the Override with Printer File (OVRPRTF) commands above. On a command line, enter INV and press F4 to view the options. You can enter your project name for the page definition and form definition. The INV command will then execute the Override with Printer File (OVRPRTF) command and rerun the invoice program with the new printer file settings.

18. Respool your file.

19. Print your spooled file in one of these ways:

    From the i5/OS, enter WRKSPLF. Make sure the device you want to print to is started, then specify option **6** (Release) by your new spooled file.

    To use iSeries Navigator, follow these steps:

a. Double-click the iSeries Access icon.

b. Double-click the iSeries Navigator icon.

c. Open a connection to an i5/OS.

d. Expand **Basic Operations** then **Printer Output**. A list of spooled files is displayed in the right-hand pane.

e. Right-click the spooled file you just created and select **Move**.

f. In the **Move** dialog, specify **Printer**. You can specify a printer name or click **Browse** to search for one. The printers that are ready have a status of **Waiting for printer output**.

Chapter 17. Using the Print Format Utility

Print Format Utility, hereafter referred to as PFU, is part of the IBM AFP Utilities (Product Number 5722-AF1). This chapter introduces PFU and describes how to use it.

Introduction to PFU

PFU lets you format data directly from iSeries database files. It is analogous to a document version of the Query product. PFU is well-suited to either quick applications or applications requiring multiple-up pages (such as labels) with bar coding. The forms and formats for printing are designed by defining a printout format definition (PFD definition) instead of writing your own application programs.

With PFU, you can:

- Design a record layout interactively.

  You can define headings, boxes, or logos that contain text, lines, images, bar codes, and graphics to be printed in addition to the data in the database file member.

- Design the page layout interactively.

  You can define headings, boxes, or logos that contain text, lines, boxes, images, bar codes, and graphics to be printed.

- Save the record layout and page layout as a printout format definition in your file.

- Print a database file member according to the printout format definition.

- Print data summary information in the database member, such as the total, average, or maximum.

PFU also lets you create various kinds of output from one database file member. For example, you can print a list of products, product descriptions, or even delivery labels from one database file member using different printout format definitions.

You can use element selection to specify selective printing of any element in a record layout. Selection is determined by the values of one to five variable fields in the database file being printed. To use the function, press `F9=Element selection` on any of the following screens and specify the conditions under which the element should be printed:

- Define text
- Change text
- Define line
- Change line
- Define box
- Change box
- Define bar code
- Change bar code
- Place graphics

- Change graphics
- Place page segment
- Change page segment

Super Sun Seeds Packing List Labels

PFU is best suited to multiple-up label applications, so labels with bar codes that support the Super Sun Seeds packing list will be the task at hand. This PFU application creates a label for each line item in a Super Sun Seeds customer order. Then labels are peeled off when the order is filled and the bar code is scanned to confirm the item selection. The labels are printed 3-up and up to 30 per 8 1/2 by 11 inch page. A sample of the labels is shown below:
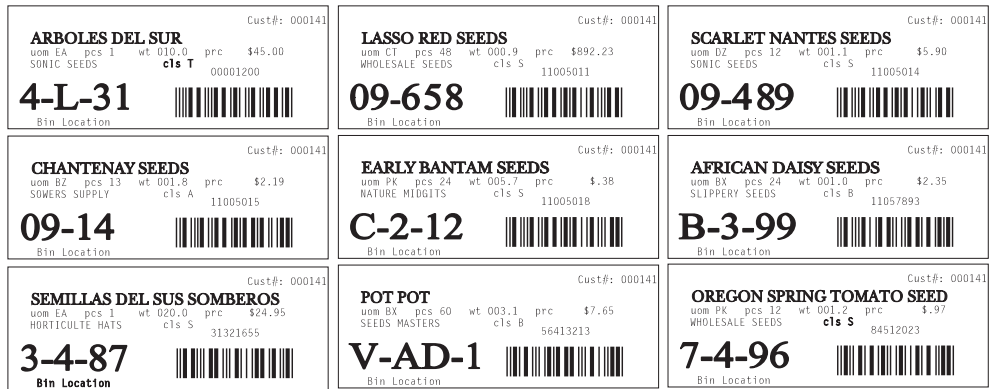
Figure 77. Packing List Label Printout

Since PFU works directly with the iSeries database, we have created an expanded customer invoice file that joins the invoice file (SEEDDETL) and the item master file (SEEDITEM). This lets both invoice and item master information to be passed to PFU with each record processed. The specification for this joined file (SEEDJOIN) is shown below:

```
SOURCE FILE . . . . . . .    SAMPLER/QDDSSRC
MEMBER  . . . . . . . . .    SEEDJOIN
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
  100      A* Super Sun Seeds Invoice/Item Join LF
  200      A          R ITMALL              JFILE(SEEDDETP SEEDITEM)
  300      A          J                     JOIN(SEEDDETP SEEDITEM)
  400      A                                JFLD(ITM1 ITEM#)
  500      A* SEEDDETP FIELDS
  600      A            RECNO       4S 0     COLHDG('Record' 'Number')
  700      A                                TEXT('Record Number')
  800      A            DELETE      1A       COLHDG('Delete')
  900      A                                TEXT('Delete Code (D)')
 1000      A            CUST#       6S 0     COLHDG('Customer' 'Number')
 1100      A                                TEXT('Customer Number')
 1200      A            STNAME      25A      COLHDG('SHIP-TO NAME')
 1300      A                                TEXT('SHIP-TO-NAME')
 1400      A            STSTRT      25A      COLHDG('SHIP STREET')
 1500      A                                TEXT('SHIP STREET')
 1600      A            STCITY      25A      COLHDG('SHIP CITY')
 1700      A                                TEXT('SHIP CITY')
 1800      A            STSTE       2A       COLHDG('ST')
 1900      A                                TEXT('STATE ADDR')
 2000      A            STZIP       9S       COLHDG('ZIP')
 2100      A                                TEXT('ZIP+4')
 2200      A                                EDTWRD('       -     ')
 2300      A            SHPVIA      10A      COLHDG('SHIP VIA')
```

```
2400    A                            TEXT('SHIP VIA')
2500    A           TERMS      10A    COLHDG('TERMS  ')
2600    A                            TEXT('TERMS  ')
2700    A           QTY1       4S 0   COLHDG('QTY01')
2800    A                            TEXT('QTY01')
2900    A           ITM1       8S 0   COLHDG('ITM01')
3000    A                            TEXT('ITM01')
3100    A* SEEDITEM FIELDS
3200    A           ITMDEL     1A     COLHDG('DELETE CODE')
3300    A                            TEXT('DELETE CODE')
3400    A           ITMDES     25A    COLHDG('ITEM DESCRIPTION')
3500    A                            TEXT('ITEM DESCRIPTION')
3600    A           ITMCLS     1A     COLHDG('ITEM' 'CLASS')
3700    A                            TEXT('ITEM CLASS')
3800    A           SHPCDE     1A     COLHDG('SHIP' 'CODE')
3900    A                            TEXT('SHIP CODE')
4000    A           UOM        2A     COLHDG('UNIT OF' 'MEAS')
4100    A                            TEXT('UNIT OF MEASURE')
4200    A           PCSUOM     2A     COLHDG('PCS/' 'UOM')
4300    A                            TEXT('PIECES/UOM')
4400    A           WHSLOC     6A     COLHDG('WHSE' 'LOC')
4500    A                            TEXT('WAREHSE LOC')
4600    A           WEIGHT     4S 1   COLHDG('#WEIGHT')
4700    A                            TEXT('#WEIGHT')
4800    A           COST       6S 2   COLHDG('COST')
4900    A                            TEXT('ITEM COST')
5000    A           SELPRC     6S 2   COLHDG('SELL' 'PRICE')
5100    A                            TEXT('SELLING PRICE')
5200    A                            EDTWRD(' ,   $0.  ')
5300    A           UTSLY      6S 0   COLHDG('UNITS' 'LST YR')
5400    A                            TEXT('UNITS LAST YEAR')
5500    A           $YTDLY     7S 2   COLHDG('SALES' 'LAST YEAR')
5600    A                            TEXT('SALES LAST YEAR')
5700    A           UTYTD      6S 0   COLHDG('UNITS' 'YTD')
5800    A                            TEXT('UNITS YR-TO-DTE')
5900    A           $YTD       7S 2   COLHDG('SALES' 'YTD')
6000    A                            TEXT('SALES YR-TO-DATE')
6100    A           SUPLR1     15A    COLHDG('SUPPLIER 1')
6200    A                            TEXT('SUPPLIER 1')
6300    A           SUPLR2     15A    COLHDG('SUPPLIER 2')
6400    A                            TEXT('SUPPLIER 2')
6500    A           DTESAL     6S     COLHDG('LSTSAL')
6600    A                            TEXT('LAST SALE')
6700    A           DTESHP     6S     COLHDG('LSTSHP')
6800    A                            TEXT('LAST SHIP')
6900    A         K CUST#
7000    A         K ITM1
                  * * * *  E N D   O F   S O U R C E  * * * *
```

PFU builds a print format definition that defines how information from the
database file is merged with other output elements (such as text, page segments,
overlays, and bar codes). PFU defines a record layout and a page layout. The
record layout defines the composition of one database record. In this example, each
line item in an invoice is a record. The page layout defines how one or more
record layouts are positioned on the page. This can be done through a one-to-one
relationship, or as in this case, we can place up to 30 records or labels on a page.

To create the labels, we first start AFP Utilities:

```
AFPU     IBM Advanced Function Printing Utilities for iSeries

Select one of the following:

  Overlay Utility
      1. Work with source overlays
      2. Work with source overlay files

  Print Format Utility
     11. Work with PFD definitions
     12. Work with PFD definition files
     13. Print database file member
     14. Print AFP Utilities tutorial

  Resource Management Utility
     21. Convert to page segment
     22. Work with overlays
     23. Work with page segments

Selection or command
===> 11
F3=Exit    F4=Prompt    F9=Retrieve    F12=Cancel    F16=System main menu
```

Figure 78. AFP Utilities Main Menu

Select option 11 to build a print definition. This display opens:

```
                      Work with PFD Definitions

File . . . . . . . . .    QPFDDEF      Name, F4 for list
  Library . . . . . . . .    SAMPLER      Name, *LIBL, *CURLIB
PFD definition . . . . .   *ALL          Name, generic*, *ALL
Position to . . . . . .                  Starting characters

Type options, press Enter.
  1=Create  2=Change  3=Copy  4=Delete  6=Print PFD definition  7=Rename
  9=Print database file

     PFD
Opt  Definition  Text                                          Changed
     BILL1
  2  ITEMLBL     Order Labels for Super Sun Seeds              03/01/96
     SHLFLBL     Shelf Lavel for Seed Items                    03/01/96
                                                                 Bottom
Parameters or command
===>
F3=Exit    F4=Prompt    F5=Refresh    F9=Retrieve    F11=Display names only
F12=Cancel
```

Figure 79. Work with PFD Definitions Display

Select option 2 to change a definition called "ITEMLBL" for the Super Sun Seeds
item labels.

```
                        Change PFD Definition

File . . . . . . . . . . . . :    QPFDDEF
  Library  . . . . . . . . :      SAMPLER
PFD definition . . . . . . :    ITEMLBL

Type options, press Enter.
  1=Select

Opt      Action
         Define PFD specifications
         Work with PFD definition fonts
  1      Specify database file
  1      Specify break fields
  1      Design record layout
  1      Design page layout
         Specify record selection
         Define printout specifications
         Specify mapping object name

F3=Exit   F5=Refresh   F9=Select all   F12=Cancel
```

Figure 80. Change PFD Definition Display

The main selection screen shows the options that can be used to build the
application. We have selected the options to specify the database file, define break
fields, design record layout, and design page layout. Pressing Enter brings up the
display for the first option, Specify Database File:

```
                        Specify Database File

 Type choices, press Enter.
   Database file  . . . . . . . . .    SEEDJOIN       Name, F4 for list
     Library  . . . . . . . . . . .      SAMPLER      Name, *LIBL, *CURLIB
   Record format  . . . . . . . . .    ITMALL         Name, *FIRST, F4 for list

 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel
```

Figure 81. Specify Database File Display

Select SEEDJOIN as the target database file for this application.

The Design Record Layout display shows the layout of a record (a label) in screen
view mode. Design elements include text, bar codes, lines, boxes, page segments,
and database fields. Fields from the database are specified by using an ampersand
("&") prefix and "." suffix. For example, the specification "&WEIGHT." is the field
WEIGHT.

```
                         Design Record Layout         Columns:   1- 74
Control  . .               PFD Definition . . . . . ITEMLBL
    *...+....1....+....2....+....3....+....4....+....5....+....6....+....7....
001 *B001 --------------*T010  &CUST#.
002 : *T002 S.                :
003 : *T005 OM.   pcs &PCSUOM.   wt &WEIGHT.   prc &SELPRC.
004 : *T007 1.    *T009 TMCLS. :
005 :            *C003        :
006 :&*T008 cation            :
007 +------------------------+
008
009
010
011
012
013
014
015
016
017
                                                              More...
    F3=Exit        F6=Text         F9=Line        F10=Box
    F11=Bar code   F21=Element edit  F22=Block edit  F24=More keys
```

Figure 82. Design Record Layout Display

When you press F4, the Change Text Detail display opens.

This displays the detail of the text line positioned at .20 inches down and .40 across. This text line contains both constant data ("uom") and fields from the database ("&uom."). A continuation display prompts for the font to used for the text and fields.

```
                         Change Text Detail

 Mark:   *T005              Measurement method:   Inch

 Type choices, press Enter.
   Position:
     Across . . . . . . . . . .  .20        0.00-22.75
     Down . . . . . . . . . . .  .40        0.00-22.75
   Text data . . . . . . . . .  uom &UOM.   pcs &PCSUOM.   wt &WEIGHT.   prc &
 SELPRC.
                                            F4 for list
   Element  . . . . . . . . . .              Name
   Format . . . . . . . . . . .  1           1=Horizontal, 2=Vertical
   Degree of rotation . . . . .  0           0, 90, 180, 270
   Color  . . . . . . . . . . .  *DEFAULT    *DEFAULT, 1=Blue, 2=Red
                                             3=Magenta, 4=Green, 5=Cyan
                                             6=Yellow, 7=Brown, 8=Black
   Underline  . . . . . . . . .  N           Y=Yes, N=No
                                                              More...
 F3=Exit   F4=Prompt   F5=Refresh   F6=Change measurement method
 F10=Edit numeric       F12=Cancel
```

Figure 83. Change Text Detail Display

The Design Record Layout display, with design elements of the label, can also be displayed in list view, as shown below. This view not only gives a summarized listing, but also facilitates line commands on specific elements (such as move, copy, remove, and restore. To change an item, place the cursor on the appropriate line and press F14.

```
                              Design Record Layout
Control  ..               PFD Definition . . . . . ITEMLBL
NBR  ID NAME  M  ACROSS  DOWN    Parameters
001  B        2   0.000   0.000  END ACROSS= 2.660   END DOWN  = 1.000
002  T        1       3       2  FONT = 0   &ITMDES.
003  C        2   1.400   0.660  &ITM1.
004  T        2   0.100   0.850  FONT=0   &WHSLOC.
005  T        2   0.200   0.400  FONT=0   uom &UOM. pcs &PCSUOM. wt &WEIGHT. prc
006  T        2   1.700   0.570  FONT=0   &ITM1.
007  T        2   0.200   0.500  FONT=0   &SUPLR1;
008  T        2   0.250   0.980  FONT=0   Bin Location
009  T        2   1.300   0.500  FONT=0   cls &ITMCLS.
010  T        2   2.000   0.150  FONT=0   Cust#: &CUST.#;
011
012
013
014
015
016
                                                            More...
    F3=Exit        F6=Text     F9=Line      F10=Box
    F11=Bar code   F13=Place   F14=Change   F24=More keys
```

Figure 84. Design Record Layout Display

With the "Design Page Layout" display, you can place one or more copies of the record layout on the page. Each record layout is filled with variable data from a record in the selected database file. With the Super Sun Seeds item labels, we want to use 8-1/2 by 11 inch label stock and position labels three across and ten deep. If we select the first record layout, we see the record positioning:

```
                          Design Page Layout           Columns:   1- 74
Control  ..              PFD Definition . . . . . ITEMLBL
    *...+....1....+....2....+....3....+....4....+....5....+....6....+....7....
001 *R001-001                  *R001-002                  *R001-003
002
003
004
005
006
007 *R001-004                  *R001-005                  *R001-006
008
009
010
011
012
013 *R001-007                  *R001-008                  *R001-009
014
015
016
017
                                                            More...
    F3=Exit        F6=Text          F9=Line          F10=Box
    F11=Bar code   F21=Element edit  F22=Block edit   F24=More keys
```

Figure 85. Design Page Layout Display

This display shows that the record layout is replicated three across and ten down.

```
                          Change Record Layout Detail

  Mark:    *R001            Measurement method:   Inch

  Type choices, press Enter.
    Position:
      Across . . . . . . . . . . .    .02         0.00-22.75
      Down . . . . . . . . . . . .    .00         0.00-22.75
    Element  . . . . . . . . . .                  Name
    Direction  . . . . . . . . . .   1            1=Across, 2=Down
    Repetition:
      Across . . . . . . . . . .     3            1-99
      Down . . . . . . . . . . . .   10           1-99
    Distance:
      Across . . . . . . . . . .     2.74         0.00-22.75
      Down . . . . . . . . . . . .   1.07         0.00-22.75

  F3=Exit    F4=Prompt    F5=Refresh    F6=Change measurement method    F12=Cancel
```

Figure 86. Change Record Layout Detail Display

Summary

PFU's ability to define "subpages" and then replicate those subpages across and down a physical page makes it appropriate for use with applications such as multiple-up labels with bar codes. In addition, since PFU works directly with a database file, it can be used for one-time or ad hoc reports and documents.

Part 3. Working with AFP Output

Part I introduced you to the architecture of output on iSeries. In Part II, we examined a number of options to develop output applications. We used a standard case study, Super Sun Seeds.com invoicing, with each tool. In Part III, we will assume that some output-enabling approach has been adopted and that a document or report has been generated onto an iSeries output queue. Part III focuses on the options to deliver that document or report to the "consumer" of the information.

Prior to the availability of the Internet, most documents and reports flowed within an enterprise as hard copy pages. Computing platforms such as i5/OS provided a set of print services that enabled the printing of these documents and reports to actual physical printers. Printing is certainly not going away, but the Internet and enterprise intranets offer a path to more timely and efficient delivery of the information. iSeries enterprises are reengineering or deploying e-business models to reduce costs, improve efficiency, and remain competitive. Generally, if a business process is made an e-business process, then the communications (documents and reports) associated with that process should also be e-business-enabled. For example, converting order entry from a batch to a web-based process is not really complete until the principal output of order entry - an order confirmation document - is also converted. Generally, this means that the output is delivered electronically.

Part III looks at the "back-end" of the iSeries output architecture, discussing options for the electronic delivery of documents and reports. This includes fax, outbound electronic delivery by e-mail, and inbound electronic delivery by client or browser access to the output.

Chapter 18. Viewing Files

The AFP Viewer provides the ability to resolve and view AFP documents.[2] It can also view other printed formats, such as SCS and ASCII, as well as a number of image file formats. From the viewer, a document or image can be annotated, reprinted, or faxed. There are two versions of the AFP Viewer: the AFP Workbench Viewer and the AFP Viewer Plug-in. The AFP Workbench Viewer is integrated into iSeries Access (specifically, the iSeries Navigator component). You can download the AFP Viewer Plug-in free from IBM at: from `http://www.printers.ibm.com/R5PSC.NSF/web/afpviewer.`

Benefits of Viewing Your Output

The ability to view a fully composed AFP document on a PC screen offers many advantages:

- Increased end-user productivity
  - Lets you proof your output before printing it
  - Lets you view information online instead of printing it
  - Indexed documents can be quickly navigated

- Reduced paper use
  - Saves money by purchasing less paper
  - Is environmentally friendly

- Enhanced customer service
  - Allows a customer service representative to immediately access a customer statement online
  - Provides a view of the complete customer statement just as it was printed
  - Indexing statements helps customer service representative easily locate a specific statement

Many i5/OS applications take advantage of the AFP Viewer so their output can easily be viewed by users at intelligent workstations.

- iSeries Access includes the AFP Viewer. It also provides all users with a graphical interface that shows them a list of i5/OS spooled files. Double-clicking on any spooled file in the list invokes the AFP Viewer, and brings up an image of that document on the PC display. As you will see in Chapter 20, "Working with Infoprint Server," on page 205, this graphical interface to your spooled files can also provide interactive access to PDF and e-mail functions
- Facsimile Support for iSeries uses the AFP Viewer to display incoming fax documents.
- Content Manager OnDemand for iSeries (OnDemand) supports the archival and retrieval of a wide variety of data types, including AFP. OnDemand can be used to selectively search for and then display, print, or fax documents that have been retrieved.

  OnDemand provides hierarchical storage management across magnetic, optical, and tape devices. The OnDemand server allows indexes, such as customer name or account number, to be created and stored. This gives the user quick and simple navigation through thousands of statements.

---

2. BCOCA is not supported by the AFP Viewer

- ImagePlus, a Content Management component, generates image documents on the i5/OS. These documents can be viewed using the AFP Viewer.
- Content Manager OnDemand for AIX provides archival and retrieval of AFP formatted documents, as well as line-mode and image documents, much like OnDemand for iSeries.

iSeries Access Viewer Details

AFP Viewer functions are available to all iSeries Access clients.

You can view iSeries spooled files, as well as documents in shared folders, on a LAN, or on a PC. The standard PC image file types that are also supported are TIFF, PCX, DCX, DIB, and GIF. Also, you can print the document on a locally attached printer, clip portions of a document to create new documents, use the IBM AFP Printer Driver for Windows to create AFP documents from PC applications, and annotate those documents.

The following functions are part of the AFP Viewer within iSeries Navigator:
- Client management of iSeries spooled files
- View AFP, SCS, and ASCII files
- View TIFF, PCX, DCX, and DIB image files
- Attach notes (annotation) to a displayed document
- Copy selected pages to a file
- Create iSeries overlays and page segments from any Windows application
- Print viewed documents or images
- Search a spooled file for target keywords
- Select and copy data to clipboard
- Print (or any print driver operation, such as fax)
- View controls, such as zoom, page rotation, and so on

AFP External Resources

A typical AFP document is "architected" with references to external page elements such as fonts, overlays, and page segments. The iSeries Access AFP Viewer retrieves those page elements and displays the entire document, including these external elements.

Overlays and Page Segments

Viewing i5/OS Spooled Files with iSeries Access
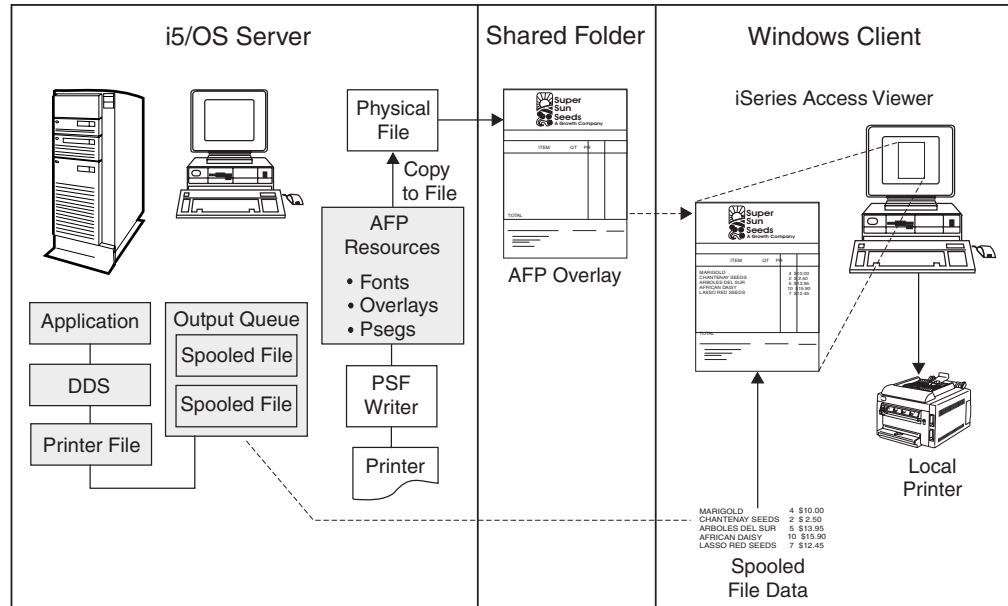
Figure 87. Viewing i5/OS Output Using iSeries Access

In order to understand this process, consider the case study of the Super Sun Seeds Invoice. When that job is a spooled file in an output queue, it contains references to page segments (Super Sun Seeds logo, and others like the strawberry, tree, and flower). It also contains references to several different AFP overlays (the different variations of the invoice form). These resources are not "inline" with the spooled file; they are simply referenced by the spooled file. If this job is released to an IPDS, AFP(*YES) printer, PSF gathers all the resources and sends them to the printer along with the spooled file.

Fonts

The AFP Viewer uses PC-resident fonts to display documents. This means that the font used in the iSeries document will be matched as closely as possible with a font available on the PC when the document is displayed with the AFP Viewer.

By default, the PC uses TrueType fonts, which are included with Windows. If the PC also has Adobe Type Manager (ATM) fonts installed and active, the AFP Viewer uses these fonts to display documents. ATM must be purchased separately from the AFP Viewer.

For best fidelity when viewing AFP documents, you should use IBM fonts that have Type 1 equivalents (such as the outline fonts that come with AFP Font Collection).

Viewing Spooled Files with iSeries Access

Follow these steps to use iSeries Access to view spooled files on your PC.

1. Double-click the iSeries Access icon. This opens the iSeries Access Window.

2. Double-click the iSeries Navigator icon. The iSeries Navigator window opens:

3. Expand **Basic Operations**.

4. Open **Printer Output**.

5. You can customize the information that appears in the Output List and which printer output you want to list, by User, Printer, Output Queue, and so on. To customize this information, select the **View** menu, then select **Customize this view**. Refer to the online help for detailed instructions.

6. Once you have the Output List organized to your liking, double-click on any spooled file in the list. This automatically invokes the AFP Workbench for Windows Viewer, which lets you do the following:

   - See your spooled file on the display (see Figure 88).
   - Use the AFP Viewer functions such as zooming and rotating.
   - Print the viewed spooled file to a locally attached printer (if function is available).
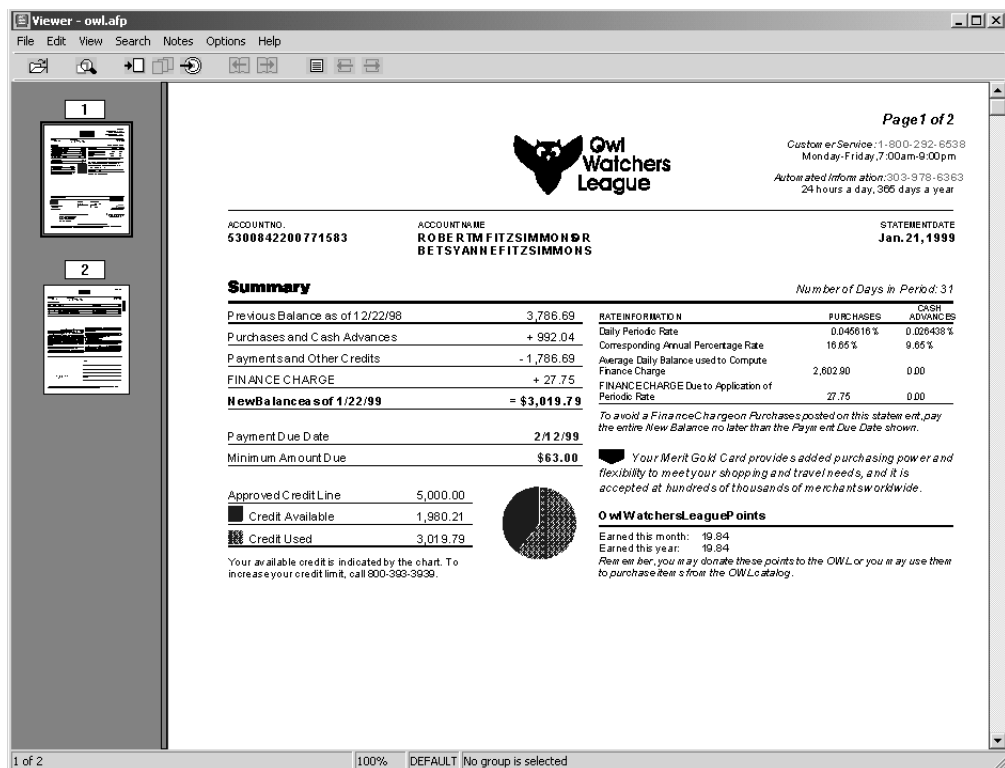
Figure 88. Spooled File Displayed

Viewing i5/OS Stream Files with iSeries Access

To view a stream file (it must be an appropriate type, such as AFP, SCS, or ASCII) in the integrated file system on the i5/OS, you must first get the file to your workstation.

To copy a file from the Integrated File System to your workstation, follow these steps:

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to an i5/OS.
4. Expand **File Systems** then **Integrated File System**. Continue to expand until the stream file you want to copy is visible.
5. Right-click on the stream file, and select **Copy**.
6. On your workstation, in the directory you want to store the stream file, right-click and select **Paste**.

To view an AFP stream file on your PC with the AFP Viewer, follow these steps:

1. Double-click the iSeries Access shortcut.
2. Move the AFP Workbench Viewer icon to your desktop (optional).
3. Double click the **AFP Workbench Viewer** icon.
4. Click **File** and select **Open**.
5. Specify the stream file to open.
6. If you indexed the stream file, certain pages are grouped together. To select a

   group to view, click the group icon:

Viewing Spooled Files with iSeries Access for Web

V5R2 iSeries Access for Web (5722–XH2) supports viewing spooled files in PDF format. The functions described below are all available if Infoprint Server is installed on the iSeries.

To view a spooled file in PDF, follow these steps:

1. Start an iSeries Access for Web session. The address is in the format `http://myiseries/webaccess/iWAHome`, where *myiseries* is your system's name.
2. Click **Printer Output**. This displays your spooled files.
3. To view a spooled file in PDF format, click the PDF link for the desired spooled file. This brings up a PDF configuration form.
4. For **Destination**, specify **Browser**.
5. The spooled file displays in your browser with the Acrobat plug-in:
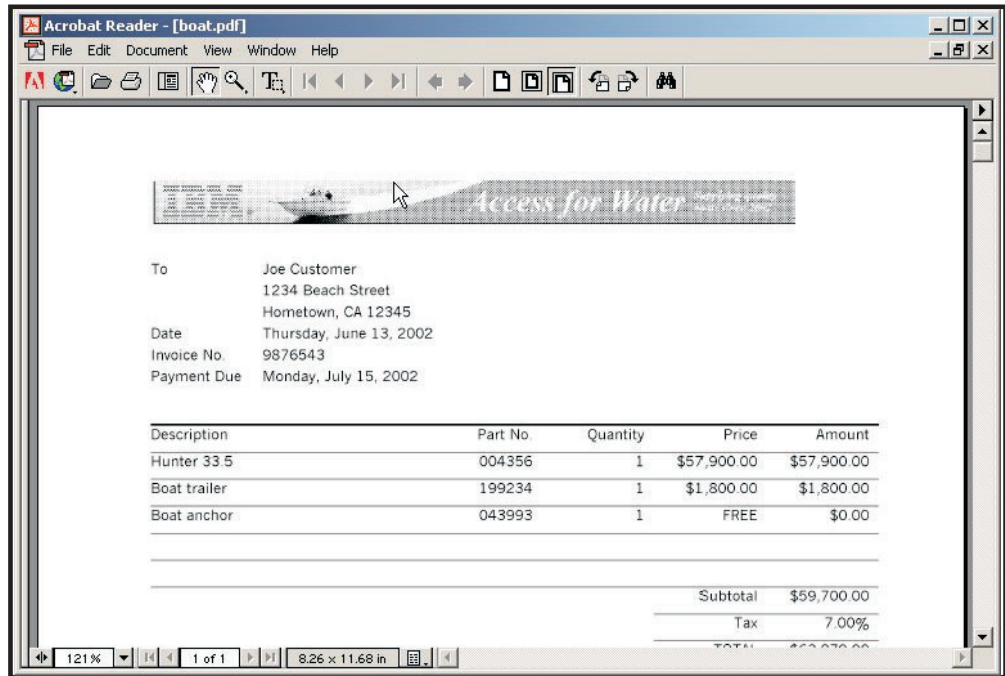
Figure 89. File Displayed in Acrobat Reader

Viewing AFP Files with the AFP Viewer Plug-In

IBM provides a free version of the AFP Workbench Viewer, called the AFP Viewer Plug-In. It is a plug-in for Web browsers (such as Internet Explorer and Netscape Navigator) on Windows systems. To download the viewer, follow the instructions on `http://www.printers.ibm.com/R5PSC.NSF/web/afpviewer`. To view an AFP file on your workstation with the AFP Viewer Plug-In, follow these steps:

1. On your workstation, navigate to the file you want to view. Double-click the file.
2. If the Open With window opens, select the browser to which you have the AFP Viewer Plug-In installed.
3. The file displays in the specified browser.

Calling the AFP Viewer Directly from Your Application

The AFP Viewer can also be called directly from your application program. You can use the Start PC Command (STRPCCMD) to invoke the Viewer program (CWBVIEWR). The program needs to be passed the complete ID of the target spooled file.

Chapter 19. Sending Your i5/OS Output by Fax

Facsimile Support for iSeries provides comprehensive facilities to manage fax within your organization. It can handle the receiving, managing, viewing, and printing of your inbound faxes. It can send any *SCS or *AFPDS spooled file on your iSeries outbound, including setting up and managing the transmission. It can also send data from a PC client that is connected to the iSeries server by iSeries Access and using the IBM AFP Facsimile Support driver. This PC client can be a Windows NT, Windows 2000, Windows 95, or Windows 3.1 client. If you have Infoprint Server installed, you can use it to respool any standard iSeries spooled file as an *AFPDS spooled file. You can then use Facsimile Support for iSeries to fax the *AFPDS spooled file.

Super Sun Seeds Case Study

Facsimile Support for iSeries works well with the Super Sun Seeds case study by providing the ability to fax a copy of the Super Sun Seeds invoice to a customer. Assuming that the information being faxed, an invoice or set of invoices for a specific customer, resides in an individual spooled file. Faxing is done most easily by providing a reprint program that selects and reprints specific invoices.

This section shows how the invoice can be faxed.

From the Facsimile Support for iSeries main menu, select option 5, "Outbound Fax". The Outbound Fax Commands Display appears.

```
 FAXOUT                    Outbound Fax Commands
                                                      System:    BLDSYS1
   Select one of the following:

       1. Work with Fax Output Queue
       2. Work with Fax File Attributes
       3. Change Fax File Attributes
       4. Delete Fax File
       5. Send Fax

     Enhanced Services:
       21. Create Fax Note
       22. Check Fax Status
       23. Print Fax Status
       24. Submit Fax

   Selection or command
   ===> 1
   F3=Exit   F4=Prompt   F9=Retrieve   F12=Cancel   F13=Information Assistant
   F16=System main menu
```

Figure 90. Outbound Fax Commands

Select option 1: Work with fax output queue.

You are prompted for output queue information. Select output queue SUPER in library QGPL.

```
                  Work with Fax Output Queue (WRKFAXQ)

 Type choices, press Enter.

 Output queue . . . . . . . . . .    super        Name, *SNDQ, *SAVQ, *ERRQ
   Library  . . . . . . . . . . .     qgpl        Name, *LIBL, *CURLIB
 Select files for:
   User . . . . . . . . . . . .     *CURRENT      Name, *CURRENT, *ALL
   User data  . . . . . . . . .     *ALL          *ALL, *CURRENT, *TIMED
                                                                      Bottom
 F3=Exit   F4=Prompt  F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 91. Work with Fax Output Queue (WRKFAXQ)

The spooled files in the SUPER output queue are displayed. Select 1: Send fax to
send the INVNEW2 spooled file as a fax. If you have set up a fax profile that has
the environment of 2: Enhanced, you will see the Submit Fax (SBMFAX) command.

```
                     Work with Fax Output Queue

 Queue:   SUPER           Library:  QGPL

 Type options, press Enter.
   1=Send fax   3=Hold   4=Delete   5=Display   6=Release

 Opt  File         FNbr  Job         User       Number  User Data
  1   INVNEW2         1  QPADEV0003  WCSHAFF     104946  INVNEW2
      QSYSPRT         2  QPADEV0003  WCSHAFF     104946
      QSYSPRT         3  QPADEV0003  WCSHAFF     104946
                                                                      Bottom
 Parameters or command
 ===>
 F3=Exit      F4=Prompt    F5=Refresh   F9=Retrieve  F12=Cancel   F17=Top
 F18=Bottom   F20=QFAXOPR  F22=Printers
 (C) COPYRIGHT IBM CORP. 1991, 1995.
```

Figure 92. Work with Fax Output Queue

Specify the fax information, including "send to" information, phone number, and
company name. Specify "*YES" in the "Create Cover Page" field to have Facsimile
Support for iSeries generate a cover sheet for the fax.

```
                          Send Fax (SNDFAX)

 Type choices, press Enter.

 Send to:
   Telephone number . . . . . . >  3039246300
   To line 1 for cover page . . . >  'Improved Printing Corp'
   To line 2 for cover page . . . >  'Performance Boulevard'
   To line 3 for cover page . . . >  PRINTERSVILLE
              + for more values
 Spooled file . . . . . . . . . >  INVNEW2       Name
 Job name . . . . . . . . . . . >  QPADEV0003    Name, *
   User . . . . . . . . . . . . >   WCSHAFF      Name
   Number . . . . . . . . . . . >    104946      000000-999999
 Spooled file number  . . . . . >  1             1-999999, *ONLY, *LAST
 Transmission mode  . . . . . . .  *FINE         *FINE, *NORMAL
 Create cover page  . . . . . . >  *YES          *NO, *YES
                                                                      More...
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 93. Send Fax Display

On this continuation display for Send Fax, specify the printer file name for the cover page and the "To" information. The printer file QPFFCVP is an AFP data stream printer file used to support the fax transmission. The Super Sun Seeds fax cover page overlay is shown in Figure 95. To use a cover page overlay, specify its name as the front overlay name in the QPFFCVP printer file.

```
                       Send Fax (SNDFAX)

 Type choices, press Enter.

 Cover page printer file  . . . .   QPFFCVP       Name, *DFT
   Library  . . . . . . . . . . .                 Name, *CURLIB
 Title line for cover page  . . .   Invoice Confirmation
 From lines:
   From line 1 for cover page . .   Super Sun Seeds
   From line 2 for cover page . .   *BLANK
   From line 3 for cover page . .   *BLANK
 Comment for cover page . . . . .   Please review
                                                              More...
 F3=Exit   F4=Prompt   F5=Refresh   F12=Cancel   F13=How to use this display
 F24=More keys
```

Figure 94. Send Fax Display (continued)

Figure 95. Sample Fax Overlay (SSSFAX)

Once the requested fax has been sent, it is listed on the outbound fax queue. The outbound fax (INVNEW2) is listed on this queue.

```
                       Work with Fax Output Queue

 Queue:   QFFSNDFAX      Library:   QUSRSYS

 Type options, press Enter.
   2=Change   3=Hold   4=Delete   5=Display   6=Release   8=Attributes

 Opt  File          FNbr  Job          User        Number  User Data
      INVNEW2          1  QPADEV0003   WCSHAFF      104946  *CURRENT
                                                                        Bottom
 Parameters or command
 ===>
 F3=Exit   F4=Prompt    F5=Refresh    F9=Retrieve   F11=View 2   F12=Cancel
 F17=Top   F18=Bottom   F20=QFAXOPR   F22=Printers
```

Figure 96. Work with Fax Output Queue

When the fax is physically sent, the Super Sun Seeds cover page with the fax information also is sent, followed by the Super Sun Seeds invoice for Improved Printing.

From this display you can also select option 5 to display the spooled file being sent (the invoice). This displays a non-graphical version of the invoice. With iSeries Access viewing support, you can display a completely graphical version of the invoice.

```
                          Display Spooled File

 File . . . . . :   INVNEW2                        Page/Line   1/12
 Control . . . . .                                 Columns     1 - 78
 Find . . . . . .
 *...+....1....+....2....+....3....+....4....+....5....+....6....+....7....+...
            IMPROVED PRINTING CORP
            PERFORMANCE BOULEVARD
            PRINTERSVILLE
            CO  45789-2637
                  100            31300         3/09/02         4/09/02
              BEST WAY            3/09/02    NET 30           YOUR PRINTER RE
           1 PK   01100517  SPARTAN SEEDS                 2.39          2.39
           9 PK   04569870  NORTHERN LITE BLUE SPRUCE   858.32      7,724.88
          12 BX   11005004  BUSH GREEN SEEDS              2.50         30.00
          12 CT   11005011  LASSO RED SEEDS            892.23     10,706.76
          26 PK   11005018  EARLY BANTAM SEEDS             .38          9.88
           5 BX   11057893  AFRICAN DAISY, SEEDS          2.35         11.75
           1 PK   15975365  HEAVY OAK                   129.09        129.09
          33 BX   32746510  HOPS BREWING LIGHT            1.20         39.60
           6 EA   46578913  SEED SURVEYING SITE          50.00        300.00
           2 BX   56413213  POT POT                       7.65         15.30
                                                                    More...
 F3=Exit   F12=Cancel   F19=Left   F20=Right   F24=More keys
 Bar codes not displayed.
```

Figure 97. Display Spooled File

Chapter 20. Working with Infoprint Server

Infoprint Server significantly expands the possibilities of print and electronic output in an iSeries environment, integrating new capabilities within the existing print framework. This chapter first illustrates how you can use Infoprint Server to accomplish various tasks in "How Can I Use Infoprint Server?" then describes how each Infoprint Server component works in these subsequent sections:

- "Transforming Your i5/OS Output to PDF" on page 214
- "E-Mail Support" on page 216
- "Indexing Output with the Create AFP Data Command" on page 217
- "Transforming ASCII Image Data to AFP" on page 219
- "Printing PCL, PDF, and PostScript Data on IPDS Printers" on page 219

For instructions about using any of these components, refer to *Infoprint Server for iSeries: User's Guide* and *IBM @server iSeries Printing VI: Delivering the Output of e-business*, SG24-6250.

How Can I Use Infoprint Server?

Let's first look at a few application scenarios to see how the functions fit in with various installations. We will examine the current application process and then how Infoprint Server functions could be used to transform that process.

Publish Output for Electronic Access

In this scenario, sales and financial reports are currently printed in hardcopy format and distributed to end users. In many cases, the recipient immediately skips to the last page to get a grand total and then discards the report. Furthermore, because we are working with hardcopy, the output is not timely and the production process of printing incurs operational costs.

Using Infoprint Server's PDF subsystem, the reports can be transformed into PDF format and stored for "inbound" access within the iSeries database, specifically the integrated file system. Recipients would use client PCs or browsers to access their reports. The reports could also be stored in the integrated file system and e-mailed to each recipient. The reports would be available immediately and printing costs would be eliminated. This takes advantage of Infoprint Server's intelligent routing function.

One advantage of the integration of the PDF subsystem into the iSeries output architecture is that standard functions that normally relate to print easily translate into desired PDF functions. For example, in the above scenario, assume that the data of interest is on pages 21-50 of the report. If you wanted to print this, you would simply override the printer file attributes to request this page range. The same function works with PDF because it is implemented as a virtual printer. Specify the page range, then pass the spooled file to the PDF subsystem. The resulting PDF contains only pages 21-50 of the report.
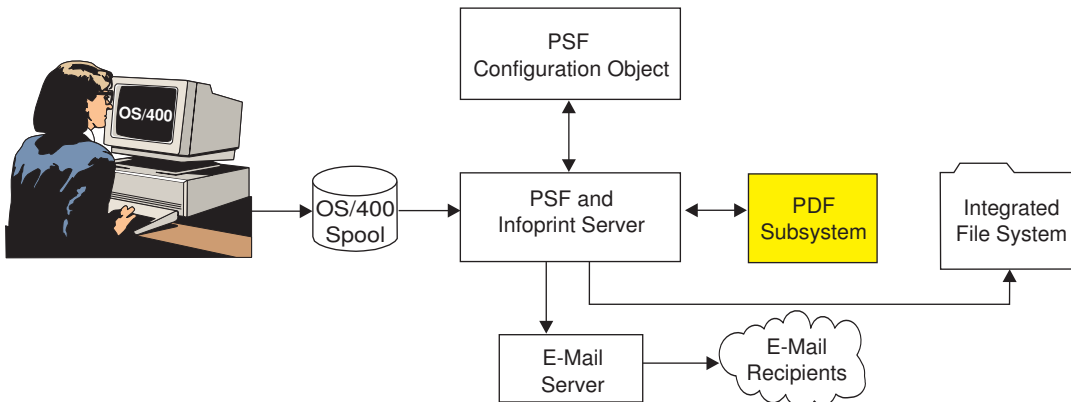
Figure 98. Publishing iSeries Output for Electronic Access

Electronic Report Distribution Using Segmentation

Here's a similar example to the one above, but with a different approach. In this case, sales reports are being produced into iSeries output queues and printed. However, as the application run represents multiple sales regions, the hardcopy output must be separated into regional reports and each regional report is physically sent to that region.

We want to transform this process in two important ways. First, we need to break up the overall report into regional "sub-reports" in order to deliver the segments to the sales regions. For example, we might have a 1000-page sales report comprised of ten different sales regions. Thus, the goal is to create ten regional reports. Second, we want to deliver the reports electronically, not in hardcopy. We also want to "push" the reports out to the regional recipients instead of having the users come get them as in the previous example.

We'll use the segmentation support in i5/OS and Infoprint Server's Create AFP Data command to insert electronic triggers within the 1000-page spooled file, delineating the ten regional report segments. Next, as we pass the spooled file for PDF processing, each regional report is transformed to PDF. At this point, we use the electronic triggers to supply the e-mail IDs for that report's distribution. Either the trigger is an actual e-mail address, or the electronic triggers (such as a region ID) are matched to actual e-mail addresses in the PDF mapping program. The integrated e-mail function sends an e-mail to those addresses with the regional PDF attached. Using the intelligent routing function, each report can also be stored as PDF in a specified location in the integrated file system for archival purposes. This "outbound" electronic process, coupled with segmentation, ensures timely delivery of the right information to the right people, with substantially reduced operational costs.
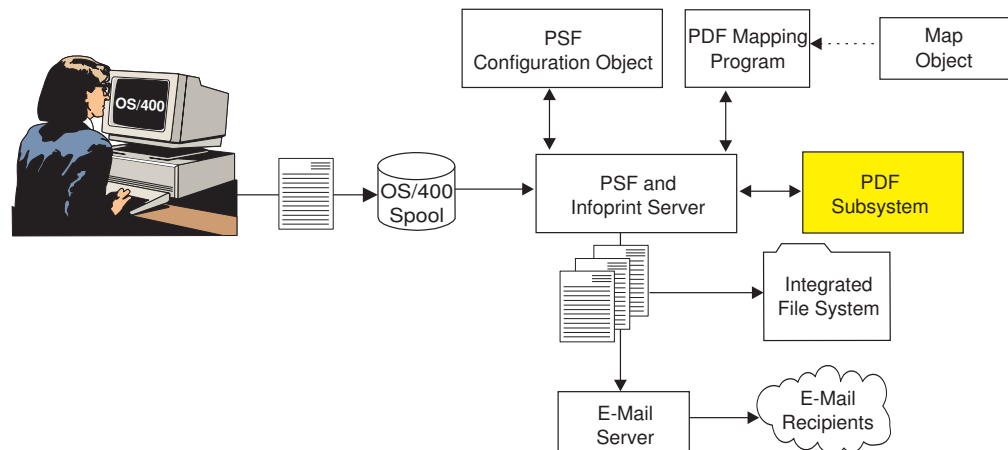
Figure 99. Electronic Report Distribution with Segmentation

E-Business Customer Documents

In a growing number of e-business processes, electronic delivery is a hard requirement, not simply a means to reduce costs and improve timeliness. Let's take an order entry application. Order entry was a batch function and has now been re-engineered as an Internet application. This lets customers enter orders directly. However, the back end of the order entry process - the order confirmation document - is still printed and sent to each customer in hardcopy. This significantly reduces the benefits of using the Internet for this function. The logical requirement is to produce the order confirmation immediately and provide it to the customer electronically.

If we assume that the order confirmation program remains essentially the same, we can create the same spooled file. With the Copy Spooled File API, we can easily create a duplicate of the order confirmation spooled file, add PDF and e-mail parameters and put it on a PDF queue for processing. The order confirmation is converted to PDF and distributed to the customer.

Alternatively, with some Internet programming, the order confirmation can be produced and then passed back to the customer's browser, which could automatically invoke Adobe Acrobat to display the PDF.
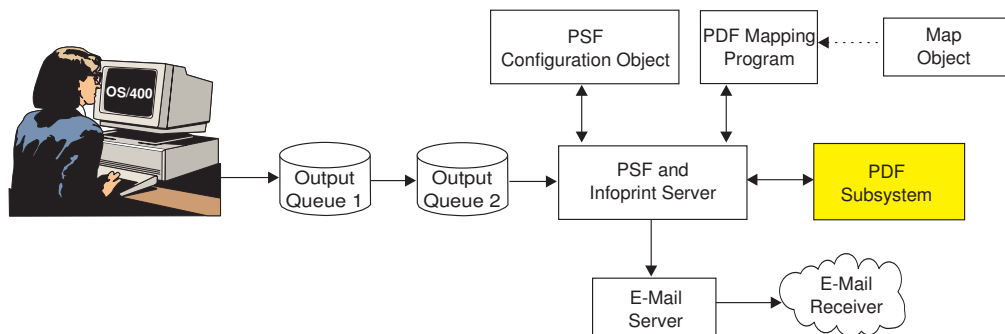
Figure 100. E-Business Customer Documents

Segmenting Customer Documents

In a variation of the sales report example, we have an application that produces customer invoices. Instead of printing the invoices and mailing them in hardcopy format, we want to provide it to the customer in whatever format they choose; hardcopy, e-mail, Web access, and links to fax as options. Additionally, a given customer could select multiple options. For example, Customer A might choose to have a copy of the order confirmation faxed and another copy placed where they can access it electronically with a browser. Customer B might choose to have their order confirmation e-mailed to three different e-mail IDs. Customer C might still want the order confirmation mailed in hardcopy format. The ability to route one spooled file or one segment of a spooled file in a combination of ways is called *intelligent routing*.

Again, we use the electronic segmentation support (Create AFP Data command) to insert triggers between customer invoices. When the entire spooled file of invoices is passed to the PDF queue, each set of pages between the triggers is converted to a PDF or AFP file[3]. At this point, the PDF subsystem can look to a PDF mapping program to provide additional information about document distribution. Certain parameters, for example, a customer number and spooled file information, can be passed to the PDF mapping program. Based on this data, the e-mail IDs (triggers) can matched to e-mail addresses and passed back for processing. In addition, other information such as e-mail content (including a password for the PDF attachments) or attachments, spooling information, and the location in the integrated file system can be defined on a per customer basis. With this information, the output is processed. This "outbound" electronic process, coupled with electronic segmentation, ensures timely delivery of customer invoices.
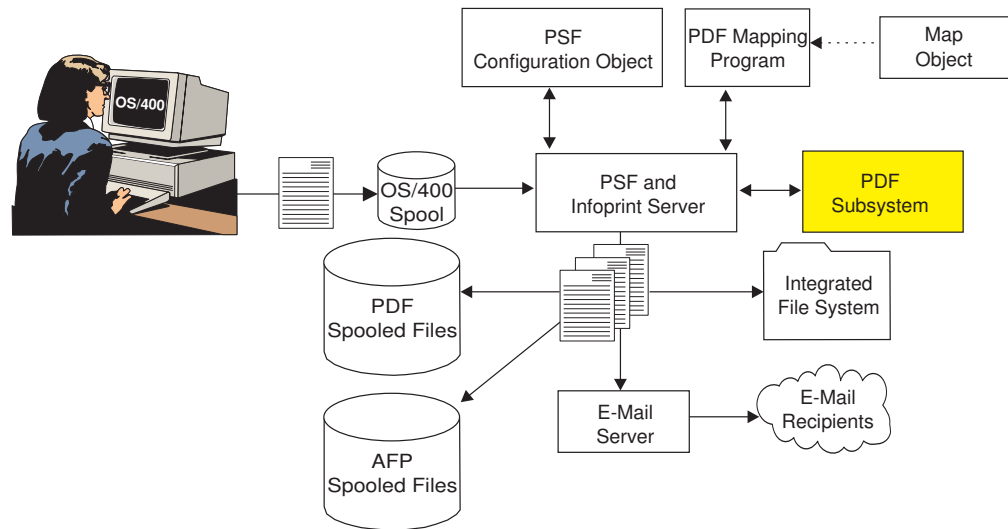
Figure 101. Segmenting Customer Documents

---

3. When you respool the action is respool as AFP, then that order confirmation can be printed, faxed (with link to a fax program), added to an archive, or similar "downstream" function. However, respooling as AFP requires PSF for i5/OS.

Consolidating Enterprise Printing

As your company has re-engineered its network topology to take advantage of intranets and the Internet, printing and printers quickly followed suit. Initially, this decentralization of printing was viewed as a good thing. However, as applications and print volumes increased, this decentralized structure could become a liability. The network-decentralized applications produce a range of ASCII print data streams (PCL, PostScript, and PDF). These data streams were designed for personal and workgroup printing, not business printing.

In addition, companies realized that having a large number of decentralized printers could add significant operational costs, system complexities, and end user frustrations to enterprise printing.

The iSeries has very good support for business printing. We can use the ASCII print data stream transforms of Infoprint Server to consolidate client and network printing on iSeries, applying its superior print management capabilities. The Infoprint Server print data stream transforms will convert PCL, PostScript, and PDF print jobs into AFP image for printing on iSeries-connected IPDS printers. This enables the application of the efficiencies and reliability of iSeries-integrated printing to your decentralized printing - saving costs and improving service levels.
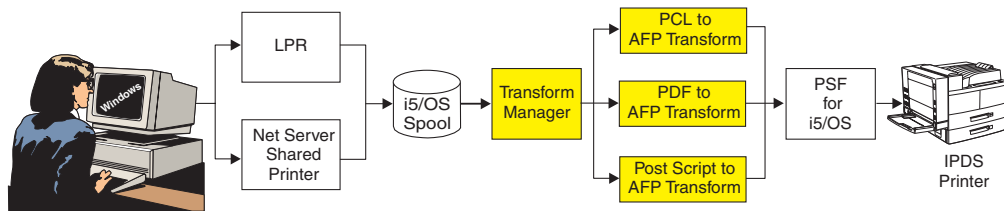
Figure 102. Consolidating Enterprise Printing

Delivering Documents and Reports over Intranet

In the first several application scenarios, we used PDF as the electronic document delivery format. PDF is the standard for Internet document delivery. But in an intranet environment, AFP is an option that offers a number of advantages.

AFP is the standard data stream within iSeries for graphical pages. As we have seen, AFP architecture structures each page by a combination of application data and references to external page resources such as overlays, images, and fonts. When AFP is sent to another system, client PC, or a browser, those external resources need to be present in order to fully resolve each page. Infoprint Server provides the function to convert a standard AFP spooled file into a fully portable file, Internet-enabled AFP. Infoprint Server's Create AFP Data (CRTAFPDTA) command can produce this fully encapsulated AFP. The command will query the AFP data stream, identify the external references, and pull those externally-referenced resources into the fully encapsulated file. This file can be accessed "inbound" off the integrated file system or sent over the company intranet. There are AFP plug-ins for Internet Explorer and Netscape to view Web AFP files in the same manner that Adobe Acrobat provides for viewing PDF files.
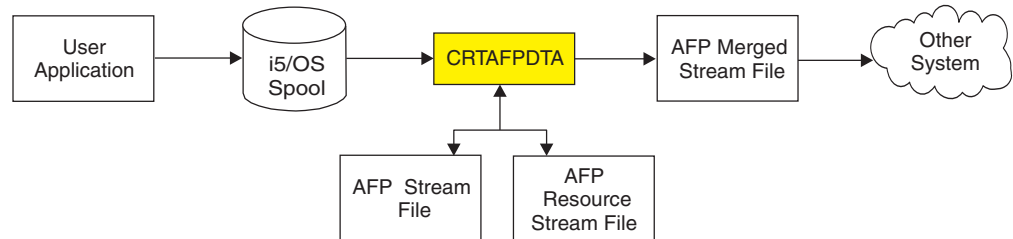
Figure 103. Delivering Documents and Reports over Intranet

Creating Electronic Documents Interactively

Frequently, there are interactive or "ad hoc" requests for documents or reports. These types of requests are the ones that need to be delivered quickly to be effective so they are prime candidates for electronic delivery.

Both iSeries Navigator and iSeries Access for Web provide for interactive access to PDF and e-mail functions, enabling electronic presentation or delivery of the information. Once a required document or report is in an iSeries output queue, either the iSeries Navigator or Web Access graphical interfaces can be used to browse and select the target spooled file. With iSeries Navigator and Infoprint Server, you can define similar PDF and e-mail functions as you can with the standard batch process. Target spooled files can be converted to PDF and written to the integrated file system, to an output queue, or sent by e-mail. With iSeries Access for Web, a selected spooled file is sent back to the browser in PDF format and automatically opened with Adobe Acrobat.
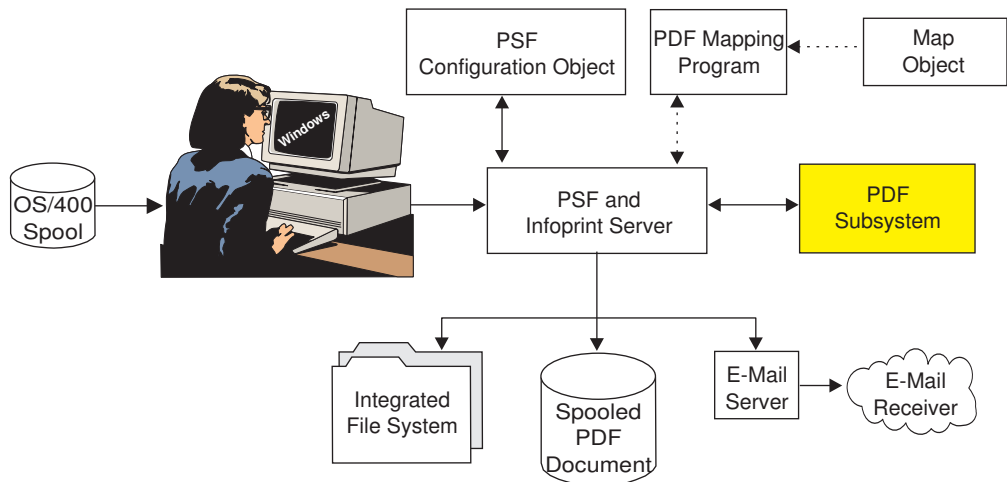
Figure 104. Creating Electronic Documents Interactively

Integrating Web Images

As your enterprise deploys Internet applications, those applications use images in standard formats - typically GIF, TIFF, and JPEG. You might need to use those images in iSeries-based line of business functions that produce output. For example, you might have an engineering workstation that produces manufacturing drawings. The work order produced by the iSeries should include that drawing.

Infoprint Server provides a set of image transforms - GIF, TIFF, and JPEG to iSeries IOCA format. The transform can create the IOCA image as an iSeries page segment object so you can reference it on a document page.
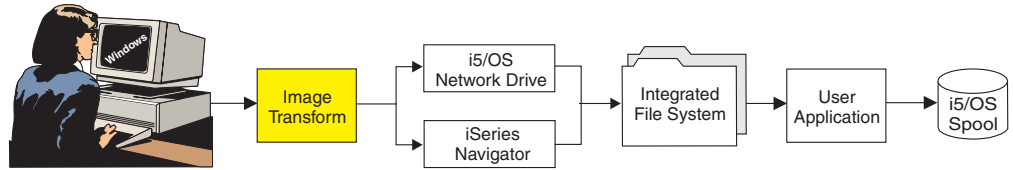
Figure 105. Integrating Web Images

Transforming Your i5/OS Output to PDF

With Infoprint Server, you get an integrated PDF subsystem that can be accessed through i5/OS CL commands or iSeries Navigator. The PDF subsystem lets you transform a spooled file or segment of a spooled file to PDF then send it as e-mail, store it in the Integrated File System, put it on an output queue, or any combination of those. In addition, you can use it with PSF and respool the input spooled file or a segment of the input as AFP. If you choose to work with segments instead of the whole input spooled file, the output is multiple PDF or AFP files, each of which you can distribute in whatever way is appropriate. This process of transforming an input spooled file to one or more output files and routing them the way you want is called *intelligent routing*. The input spooled file can be any type of data that PSF for i5/OS can print.

Notes:

1. The PDF subsystem interacts with PSF to process data. However, you do not need a license for PSF to use the PDF subsystem except to respool data as AFP.
2. You cannot use the intelligent routing function with iSeries Navigator. With iSeries Navigator, you can transform a spooled file to PDF and route it one way.

Before you can invoke the PDF subsystem, you need these:

- A PSF configuration object that specifies that data is to be transformed to PDF. The PSF configuration object also specifies what is done with the PDF output. If your spooled file contains groups, use the PSF configuration object to specify whether the transform generates a separate PDF file for each group or one PDF file containing all of the data and index tags at group boundaries.
- A properly configured device that specifies the PSF configuration object on the User defined object parameter.
- (optional) PDF mapping program to further customize the output. For example, you can use it to specify the e-mail's subject text, the output file's name, and the output file's location in the integrated file system.
- (optional) A map object to specify values to an IBM-supplied PDF mapping program. The map object acts like a database of values that the IBM-supplied PDF mapping program reads. You can create a map object by using CL commands or the PDF map APIs. Any time a PDF mapping program is used, you could use a map object and the IBM-supplied PDF mapping program instead. You would use either a user-created PDF mapping program or a map object, not both.

The PDF subsystem looks like a printer to the i5/OS, but instead of actually printing data, it transforms the spooled file then works with PSF to distribute the input. This is how the PDF subsystem works:

1. A spooled file is sent to a device that specifies a PSF configuration object. The PSF configuration object specifies that data is to be transformed to PDF.
2. The PDF subsystem transforms the spooled file and works with PSF to put the PDF file in the specified location in the Integrated File System, spools it as a PDF or AFP file for printing, e-mails it, or any combination of those. It can optionally use information from a PDF mapping program to customize the output.

Figure 106 on page 215 illustrates this process.
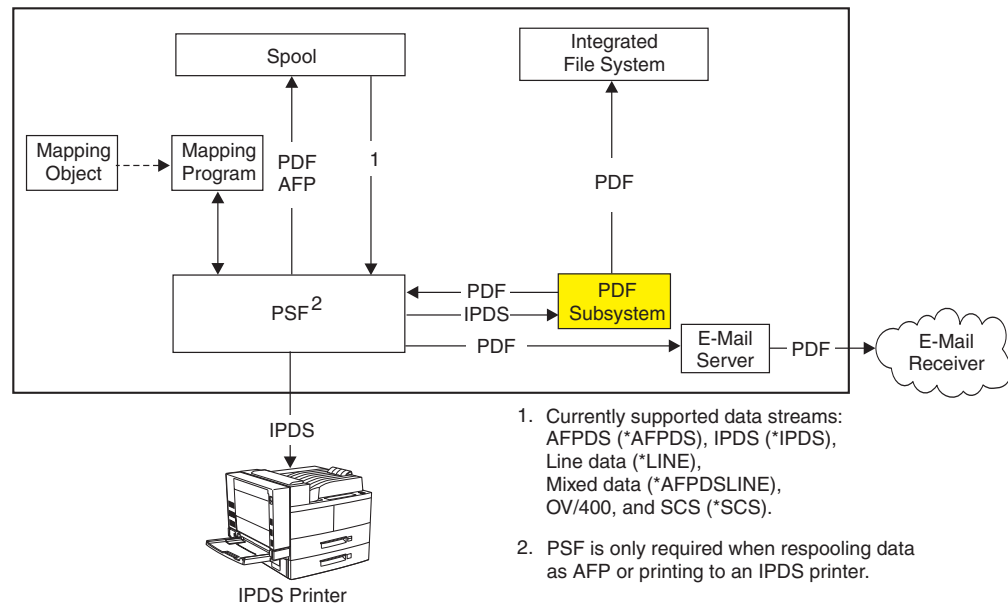
Figure 106. Transforming a Spooled File to PDF

Accessing the PDF Subsystem

While the normal access to PDF functions is through PDF queues, there are several additional ways to access the PDF subsystem:

- iSeries Navigator
- Copy Spooled File i5/OS API
- CL commands

Before you can invoke the PDF subsystem, you need to ensure that you have met all of the requirements listed on page 214.

To access the PDF subsystem from iSeries Navigator:

First, ensure that AFP Manager is installed. Then you simply right-click the printer output (spooled file), select **Convert to PDF...**, and fill in the appropriate values on the Convert to PDF window. See "Converting a Spooled File to PDF for E-mailing, Spooling, or Storing" on page 230 for more details. You cannot use the intelligent routing function with iSeries Navigator. With iSeries Navigator, you can transform a spooled file to PDF and route it one way.

Accessing the PDF subsystem from the Copy Spooled File API:

The Copy Spooled File API can help you automate the process of accessing the PDF subsystem. Assume, for example, that you have a Web application that processes orders and generates a spooled file from the order. You can use the Copy Spooled File API to make a copy of the spooled file and put it on an output queue that is set up to send data to the PDF subsystem. If the writer associated with that queue is started and the spooled file is in ready state, the spooled file is processed without user intervention.

To access the PDF subsystem from the i5/OS command line:

Use one of the i5/OS output queue commands to move the target spooled files to the queue of an appropriately configured PDF device.

For more information about using the Infoprint Server PDF subsystem, including detailed setup information, instructions about using iSeries Navigator, and instructions about using the command line, refer to *Infoprint Server for iSeries: User's Guide* and *IBM@server iSeries Printing VI: Delivering the Output of e-business*, SG24-6250.

Intelligent Routing

Intelligent routing is the ability to send a spooled file to the PDF subsystem and specify that the output be distributed in any combination of these ways:
- spooled to an output queue as AFP or PDF data
- stored as a PDF stream file in the integrated file system
- sent as a PDF file attached to an e-mail

When you use intelligent routing, you might want to use a *PDF mapping program*. A PDF mapping program is used to specify what you want done with the output files and lets you specify some options (such as PDF encryption for e-mail) that you cannot specify with a PSF configuration object. You can either write a PDF mapping program or you can use the IBM-supplied PDF mapping program. If you use the IBM-supplied PDF mapping program, you must use a *map object* with it. A map object passes values to the IBM-supplied PDF mapping program. You use i5/OS panels or the PDF map APIs to create map object.

Intelligent routing can be applied to files generated from group tags in the input spooled file as well. If your input spooled file has group tags and you specify PDFMULT(*YES *SPLIT) on the PSF configuration object, by default each generated output file is distributed the same way. For example, if you specified PDFGEN(*MAIL), by default each PDF file is e-mailed. If you do not want them all distributed the same way, use a PDF mapping program to specify how to distribute each generated file.

For more information about using the PDF subsystem, including information about the PDF mapping program and map object, setting up your device and PSF configuration object, and descriptions of the PSF configuration object parameters related to the PDF subsystem, refer to *Infoprint Server for iSeries: User's Guide* or the Redpaper *IBM @server iSeries Printing VII: Infoprint Server Implementation*.

E-Mail Support

To send a spooled file as e-mail, PSF receives a spooled file that has been sent to an appropriate device (described in the above section). PSF then sends the spooled file to the PDF subsystem. The PDF subsystem transforms the spooled file and sends the PDF file back to PSF. PSF e-mails the PDF file as an attachment to the specified receiver.

The simplest way to send e-mail is to accept default text for the e-mail subject and body and specify a valid e-mail addresses on the User defined data (USRDFNDTA) field in the printer file or the spooled file, or in the data. Alternatively, you can use DDS keywords or the Infoprint Server CRTAFPDTA command to specify the e-mail address in the data.

PSF can optionally use information from a user-defined or IBM-supplied PDF mapping program (hereafter, both are referred to as the PDF mapping program) to customize the e-mail. A PDF mapping program is a versatile user exit program. You can use it to interpret your mail tags, specify the e-mail subject, and add text to the beginning of each e-mail. You can also use it to specify the PDF attachment's name, encryption options, and more. If you use an SMTP server to send the e-mail, you can also use the PDF mapping program to specify carbon copy (cc), blind carbon copy (bcc), and reply to addresses, files to use as the e-mail body, and attachments, and more. You do not have to use a PDF mapping program unless you want to specify options that are not available on the PSF configuration object.

PSF uses the i5/OS SNDDST command or a specified SMTP server to send the e-mail. The mail server to use is specified on the PSF configuration object.

Indexing Output with the Create AFP Data Command

Indexing your output lets you quickly navigate through large files to find the information you need. For example, a telephone company might have one file that contains all of their bills for the month. If it is properly indexed, a customer service representative can open the file for the appropriate month in the AFP Viewer and use the index to search for a customer's bill based on the name, phone number, or other identifier.

The Infoprint Server Create AFP Data (CRTAFPDTA) command transforms a line (*LINE) or mixed (*AFPDSLINE) spooled file into AFP (*AFPDS). It can also take an AFP spooled file as input and output an AFP stream file. It indexes a line, mixed, or AFP document for viewing, archiving, or document retrieval, and optionally retrieves and packages the AFP resources that are needed for printing or viewing.

CRTAFPDTA takes input data from the spool and creates up to four stream files in the Integrated File System:

AFP stream file
The AFP document. This file is always created. Specify a value for **To stream file** (TOSTMF) to generate this file.

Resource stream file
A stream file that contains all the resources needed for printing or viewing. This file is optional, but is useful for archiving and viewing the document. Specify a value for **To resource stream file** (TORSCSTMF) to generate this file.

Index stream file
A stream file that contains indexing information. This file is optional, but is useful for viewing the document. Specify a value for **To index stream file** (TOIDXSTMF) to generate this file.

Merged stream file
A stream file that merges the AFP file with any of the other above files that are created. This file is optional, but is useful for archiving and viewing the document. Specify a value for **To merged stream file** (TOMRGSTMF) to generate this file.

After these files are created, you can route them to an archive system, re-queue them for printing, or view them using viewers such as the AFP Viewer or the AFP Viewer plug-in. Figure 107 on page 218 illustrates this process:
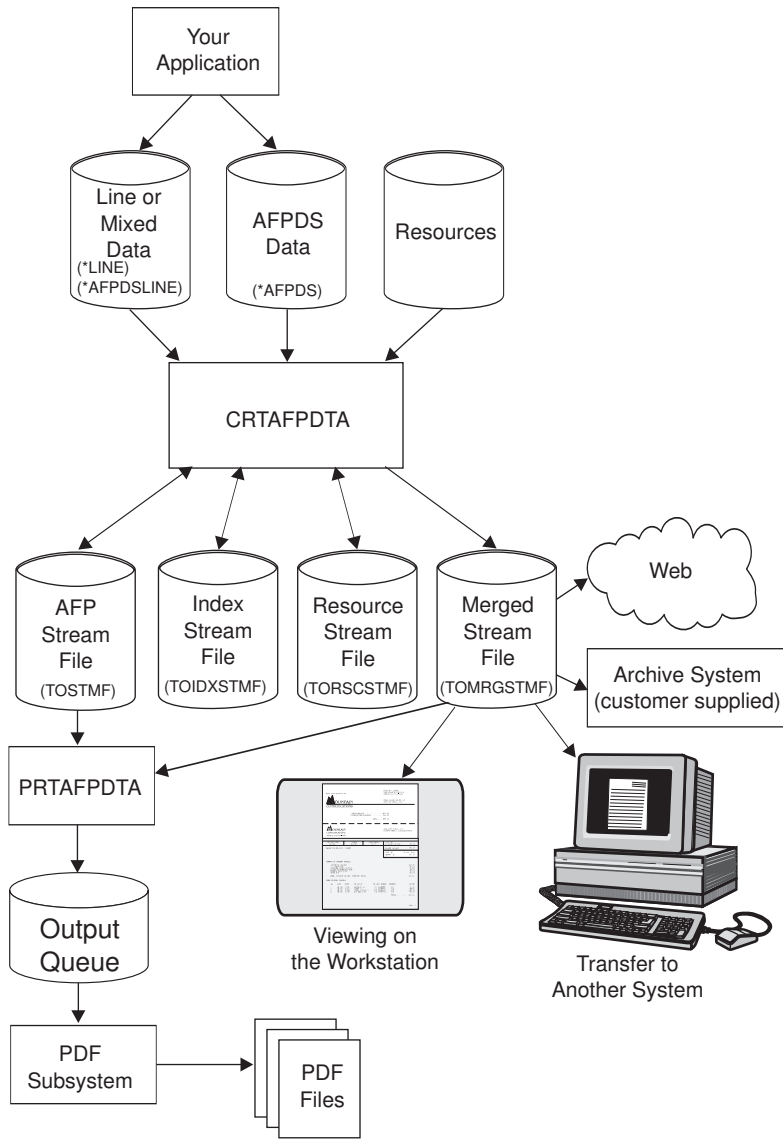
Figure 107. How the Infoprint Server Create AFP Data Command Works

The CRTAFPDTA command is going to read in line, mixed, or AFP print data, then retrieve the external page resources (such as fonts, images, and overlays) that are referenced in that print data. The output can include an index stream file or a resources stream file. Or, in the most likely scenario, a merged stream file is created with the index and resource data embedded.

CRTAFPDTA implements functionality available to other platforms with AFP Conversion and Indexing Facility (ACIF). ACIF is part of PSF on MVS, VM, and VSE and is also part of Infoprint Manager on AIX and Windows NT. You can find more information about using the functions available through the CRTAFPDTA command in *AFP Conversion and Indexing Facility*: User's Guide, S544-5285.

Transforming ASCII Image Data to AFP

Infoprint Server comes with three Windows-based image transforms that can convert GIF, TIFF, and JPEG images to AFP documents, page segments, and overlays. The transform processes bilevel (black and white), grayscale and color images. The output is bilevel, 4-bit or 8-bit grayscale, or 24-bit YCbCr color.

These are command-driven transforms so you can control nearly every aspect of the transformation, including output type, output image dimensions, and rotation. To transform an image, enter *type*2afp along with any parameters you want, on a DOS prompt, where *type* is gif, tiff, or jpeg.

Example:

In this example, we transform a TIFF file called MyOverlay.tiff into an AFP overlay called MyOverlay.afp. It is stored in the specified directory so it can easily be imported to the system MyIseries. Enter this command at a DOS prompt:

```
tiff2afp MyOverlay.tiff -pagetype overlay -o MyOverlay.afp  \\MyIseries\QDLS\
```

After the AFP resource (page segment or overlay) is created, you can use iSeries Navigator or CL commands to create it on your iSeries as a resource.

Printing PCL, PDF, and PostScript Data on IPDS Printers

Infoprint Server lets you send PCL, PDF, and PostScript data to print on IPDS printers. This gives more applications access to the speed, power, throughput, and IPDS error recovery of your iSeries printers.

Notes:
1. Printing PDF and PostScript data to an IPDS printer requires priced feature 5101.
2. Printing on IPDS printers requires PSF for i5/OS.

When a spooled file is released and has one of the data formats for which a transform is provided, an i5/OS AFP printer writer can automatically call image print transform. Next, image print transform calls the appropriate transform program. The PDF, PCL, or PostScript data is then converted to an AFP image to preserve fidelity and printed on the IPDS printer.

If you want a printer writer to automatically use a transform, you must specify appropriate values in the configuration file qxtrtfmmgr.cfg and you must specify an appropriate image configuration object in the printer device description. Refer to *Infoprint Server for iSeries: User's Guide* for information about setting up your system to use these transforms. In the configuration file, you can specify how many transforms of each type to initialize upon startup and how many can run at once.

These transforms are managed by Transform Manager. Enter STRTFMMGR on the command prompt to start Transform Manager. This starts the minimum number of each type of transform specified in the configuration file. Enter ENDTFMMGR on the command prompt to end Transform Manager. This command immediately ends all transform jobs started by Transform Manager.

Chapter 21. Working with Your iSeries from a Windows Client

IBM provides two tools that you can use to control your iSeries from a workstation: iSeries Access and iSeries Access for Web. This chapter describes both of those tools and contains instructions to use iSeries Navigator to complete these tasks:

- "Converting a Spooled File to PDF for E-mailing, Spooling, or Storing" on page 230
- "Creating a PSF Configuration Object" on page 232
- "Changing a PSF Configuration Object" on page 233
- "Importing Resources to the i5/OS" on page 234
- "Creating a Printer Share" on page 235
- "Specifying which Libraries to Display" on page 238

Many of these tasks require AFP Manager, a component of iSeries Navigator.

iSeries Access

iSeries Access for Windows delivers TCP/IP connectivity to users running a variety of Microsoft Windows operating systems. iSeries Access offers an all-inclusive client solution for accessing and using resources from your Windows desktop. It includes 5250 emulation, access to DB2 Universal Database (UDB) for iSeries through its Data Transfer, and uses AS/400 NetServer for working with the i5/OS Integrated File System and printers. It also has a variety of middleware for using and developing client applications to access i5/OS resources; and Operations Navigator, the i5/OS GUI, for administering iSeries and AS/400 servers.

A window like the one shown in Figure 108 on page 222 opens when you double-click the iSeries Access icon. Double-click any of the components, such as iSeries Navigator, to open them.
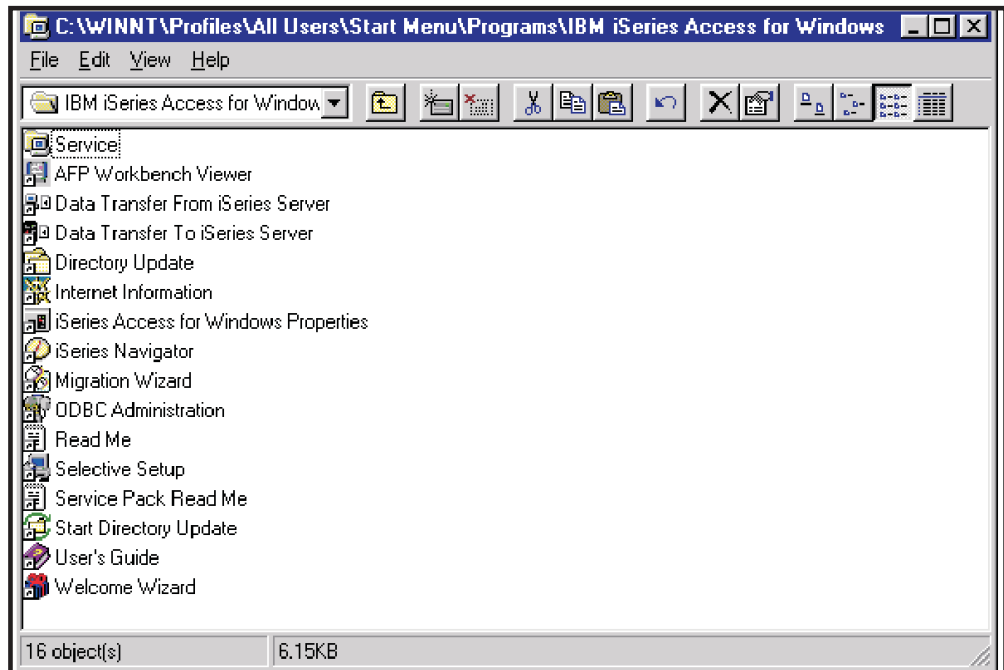
Figure 108. iSeries Access Components

iSeries Navigator

iSeries Navigator, formerly known as Operations Navigator and Management
Central, is the strategic user interface for your iSeries servers. It provides
integrated systems management with an easy-to-use graphical user interface. It is a
component of iSeries Access. When you start iSeries Navigator and expand an
iSeries connection, the window shown in Figure 109 on page 223 opens. It varies
according to the components you install.
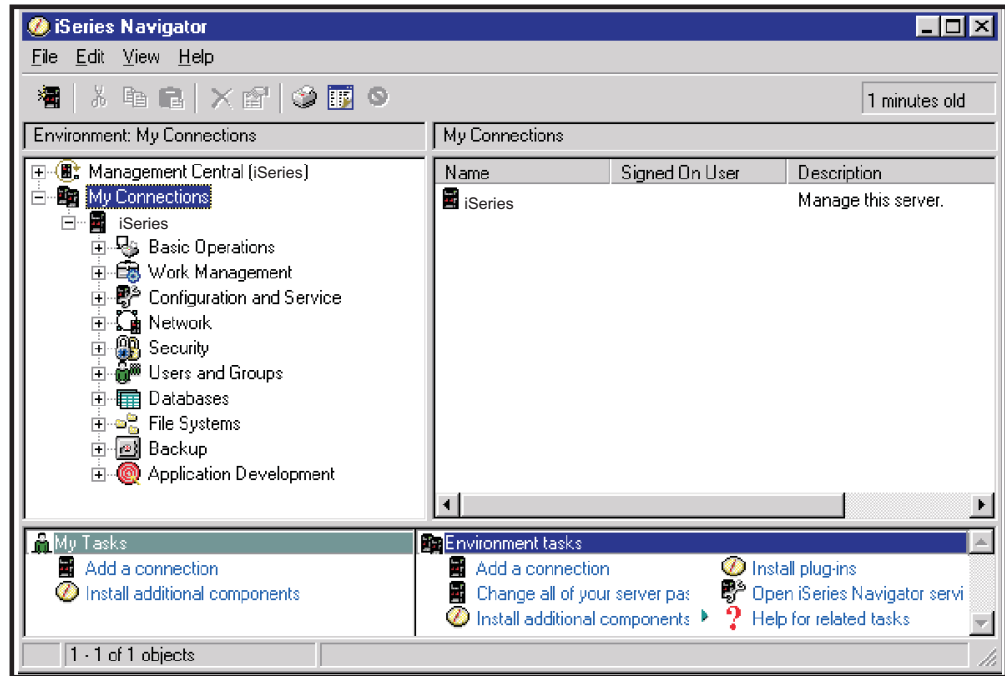
Figure 109. iSeries Navigator Window

AFP Manager

AFP Manager is the component of iSeries Navigator that gives you access to AFP print objects, including resources, PSF configuration objects, and font mapping tables. These objects are shown in Figure 110 on page 224. If you have AFP Manager installed, you can transform a spooled file to PDF and send it as e-mail, store it on an output queue, or save it in the Integrated File System in one step.
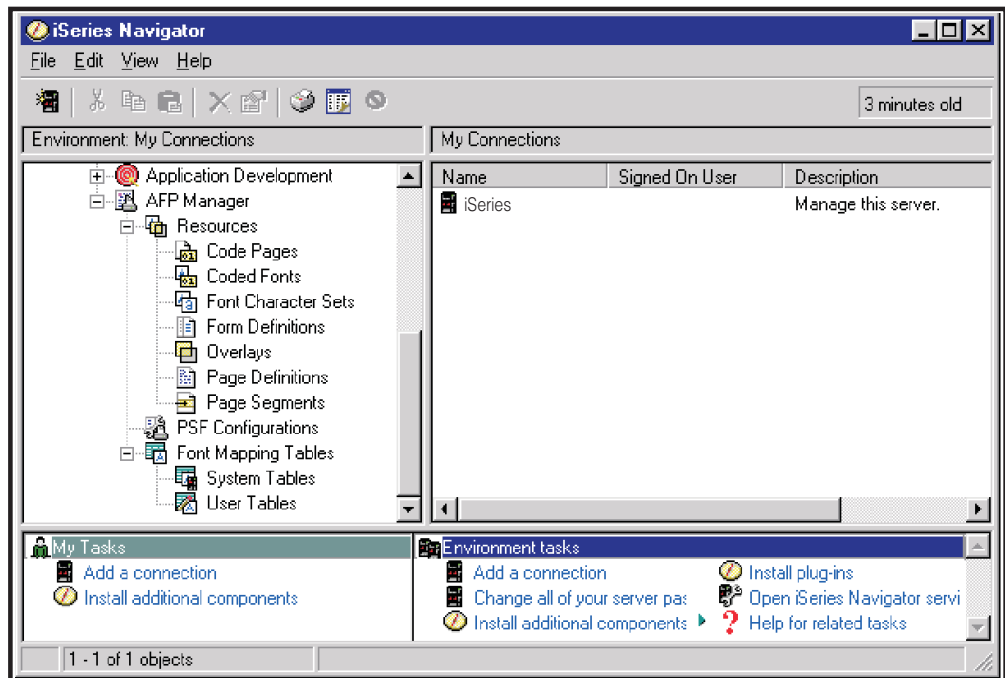
Figure 110. AFP Manager

iSeries Access for Web

IBM iSeries Access for Web (5722-XH1) offers browser-based access to iSeries servers. It enables end users to leverage business information, applications, and resources across an enterprise by extending the iSeries resources to the client desktop through a Web browser. iSeries Access for Web implements many of the functions available through iSeries Access, including the ability to work with Infoprint Server to display and print iSeries spooled files in PDF format. It has these print-related capabilities:

- **Printers** - It lists all of the printers on the system. You can work with your printers from either of two views. The basic view requires little understanding of iSeries print internals, while the advanced view lets users control writers, printers, and their output queues individually.

- **Printer Shares** - It lists all of the printer shares on the system. If a printer is associated with the share, you can control it like any other printer.

- **Internet Printers** - It lists the internet printers on the system. If the internet printer is associated with an actual printer, you can control it like any other printer.

- **Output Queues** - It lists the output queues on the system and lets you hold or release an individual queue.

- **Spooled files** - By default iSeries Access for Web lists all of the spooled files for the user that is signed on. For individual spooled files, these actions are supported, depending on the current status of the spooled file:

  - Display message
  - Reply to message
  - Print next
  - Hold

– Release

– Delete

– PDF

– Preview options: GIF, TIFF, PCL, and AFP Viewer.

iSeries Access for Web is installed on your i5/OS server and only requires a Web browser on the client machine. Once installed, the link to iSeries Access for Web is `http://myiseries:optionalport#/webaccess/iWAHome`, where `myiseries` is the system name. If http is configured for something other than the default port, the *optionalport#* must be specified. This is the iSeries Access for Web home page:
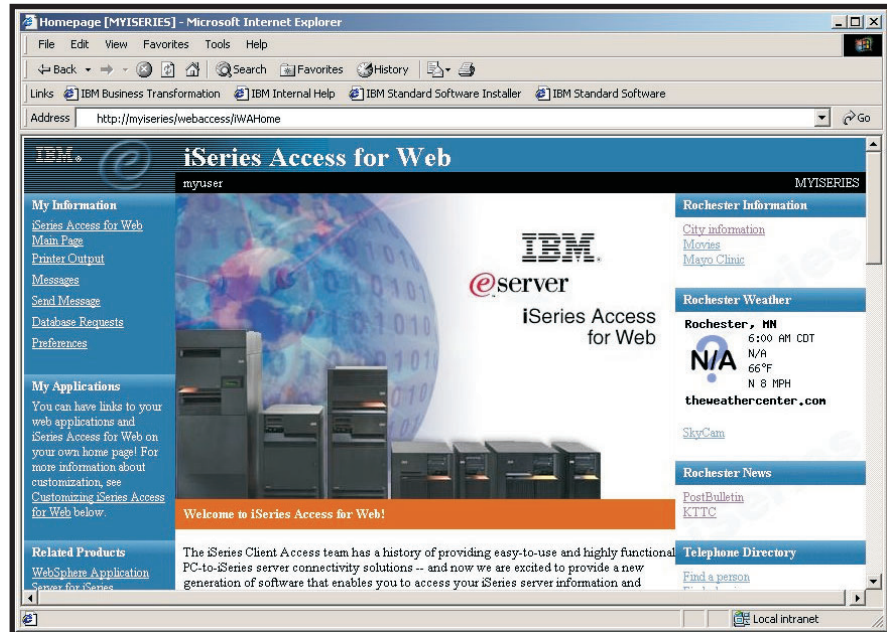
Figure 111. iSeries Access for Web Home Page

For more information about iSeries Access for Web, refer to this Web page: `http://www-1.ibm.com/servers/eserver/iseries/access/web/`

Using iSeries Access for Web to Convert and View a Spooled File in PDF

You can use iSeries Access for Web to convert a spooled file to PDF and view it, place it in a folder on the iSeries, or e-mail it. This requires Infoprint Server. Follow these steps to convert a spooled file to PDF:

1. Start an iSeries Access for Web session.

2. Click **Printer Output**. This displays your spooled files, as shown below:
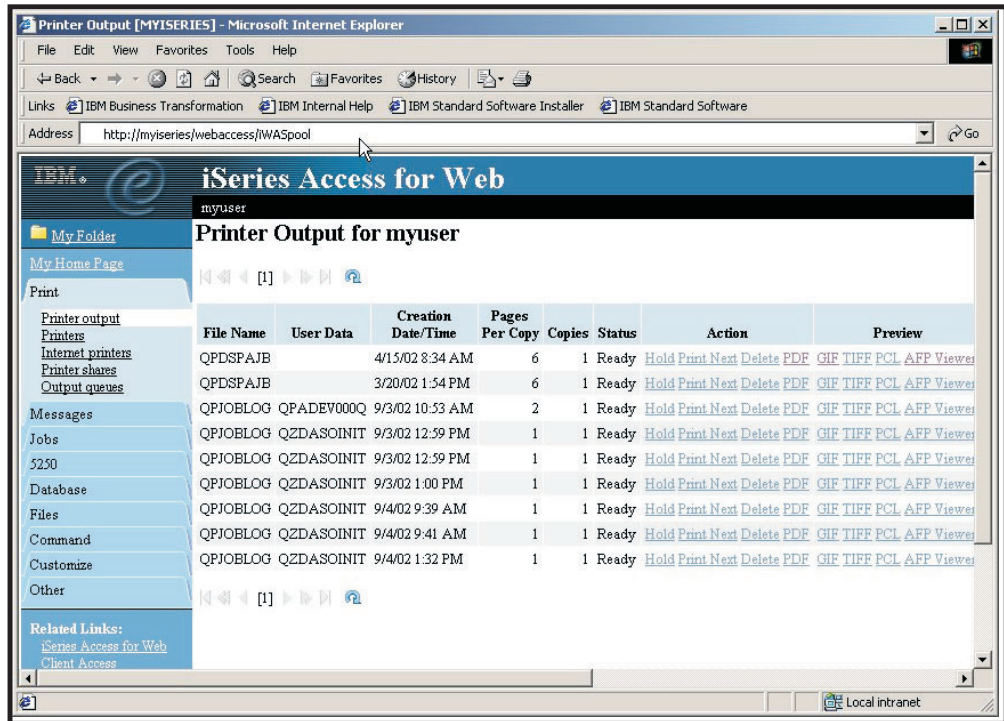
Figure 112. iSeries Access for Web Home Page

3. To view a spooled file in PDF format, click the PDF link for the desired spooled file. This brings up a PDF configuration form, as shown below:
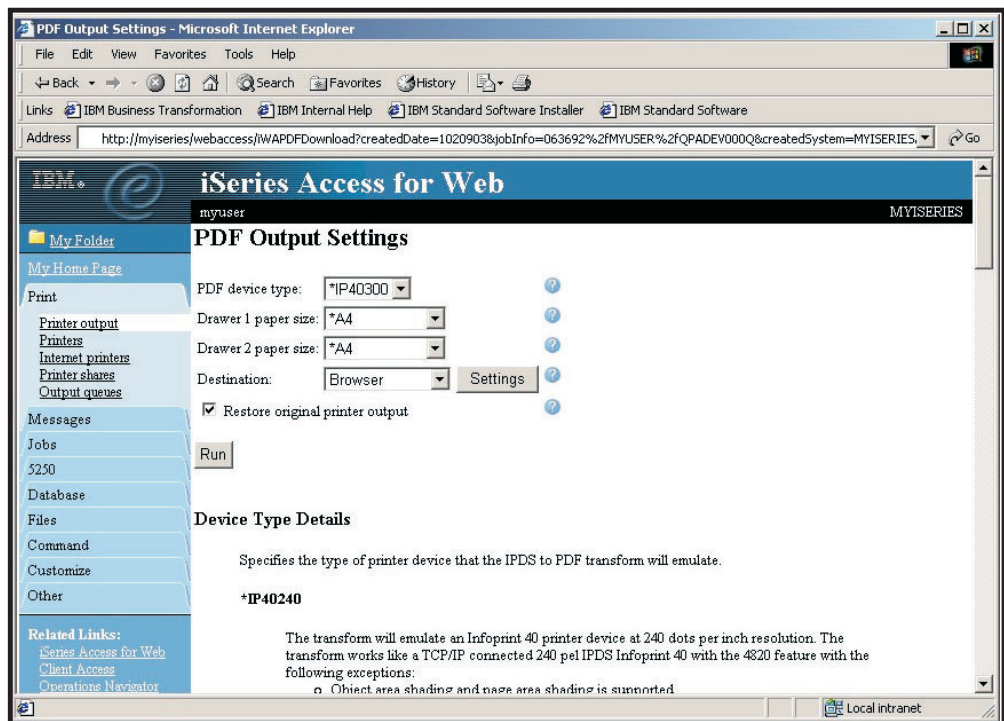
Figure 113. PDF Output Settings Page

4. For **Destination**, specify one of these options:

- **Browser** displays the PDF file in your Web browser using the Acrobat Reader plug-in, as shown below:
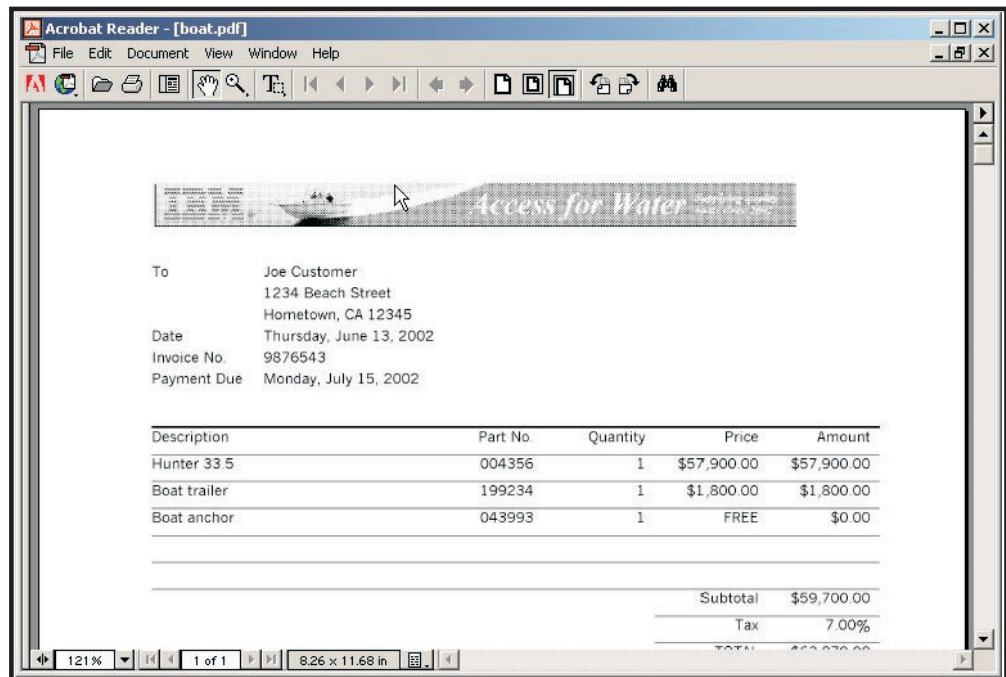
Figure 114. File Displayed in Acrobat Reader

- **Personal Folder** lets you name the PDF file and place it in your iSeries Access for Web folder and place it in other iSeries Access for Web users' folders. It also displays the PDF file with the Acrobat Reader plug-in. A personal folder with one PDF folder item in it is shown below: The My Folder link is in the upper left corner of the home page.
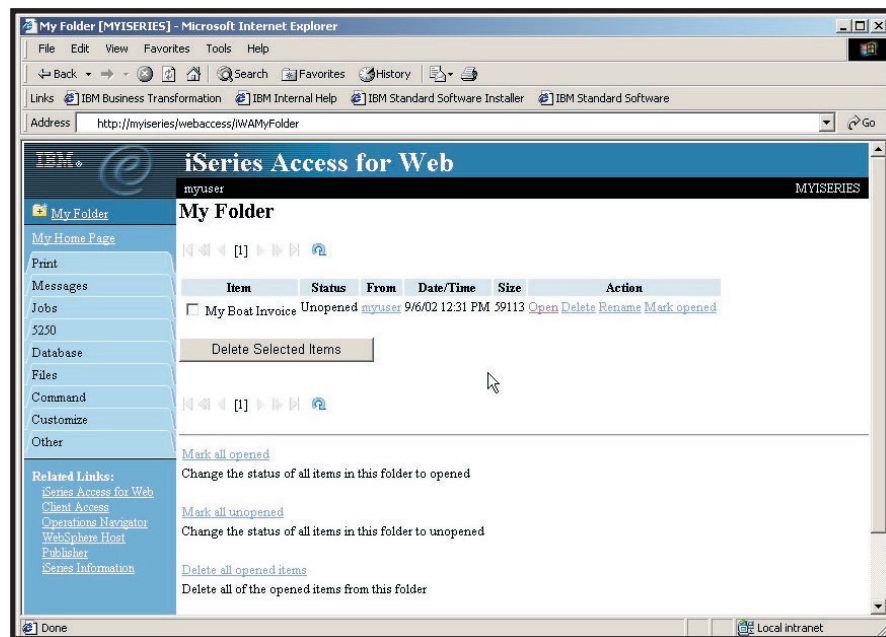
Figure 115. Personal Folder Page

- **Mail as Attachment**[4] [5] lets you send the PDF file as an e-mail attachment. You can specify the subject and message content, as shown below:
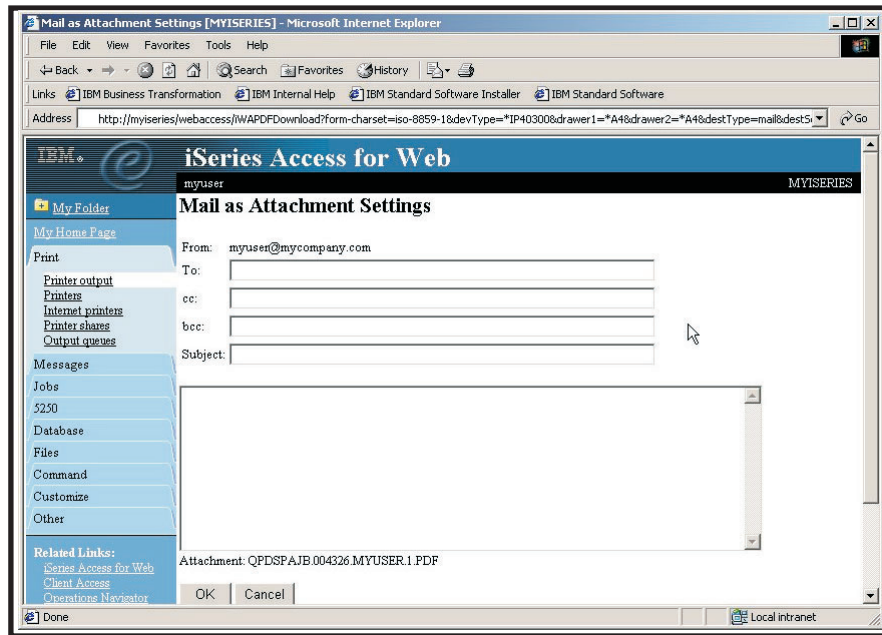
Figure 116. Settings for Mail an Attachment Option

5. Specify whether you want the original spooled file to stay on the output queue after it is transformed to PDF.

Using iSeries Access

These sections give you step-by-step directions for using iSeries Access to complete i5/OS print-related tasks.

Installing AFP Manager

Many of the tasks described in this section require AFP Manager. If you specified Full Install at install time, AFP Manager is automatically installed. Otherwise, follow these steps to install AFP Manager:

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to an iSeries system.
4. Click **Install additional components** in the task window, this option is circled in Figure 117 on page 229.

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4. This option does not use Infoprint Server e-mail support.

5. This option is only available if you have used the iSeries Access for Web SMTP mail configuration support.
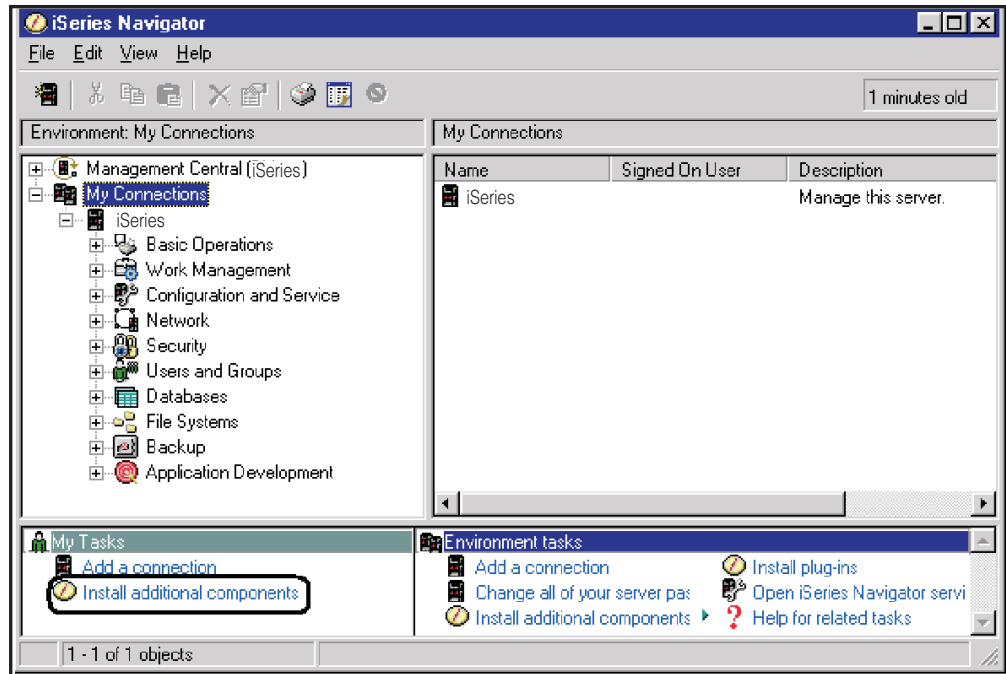
Figure 117. iSeries Navigator Window – Install Additional Components

5. The Selective Setup window opens. Click the arrow to specify the iSeries from which you want to install AFP Manager and click **OK**.
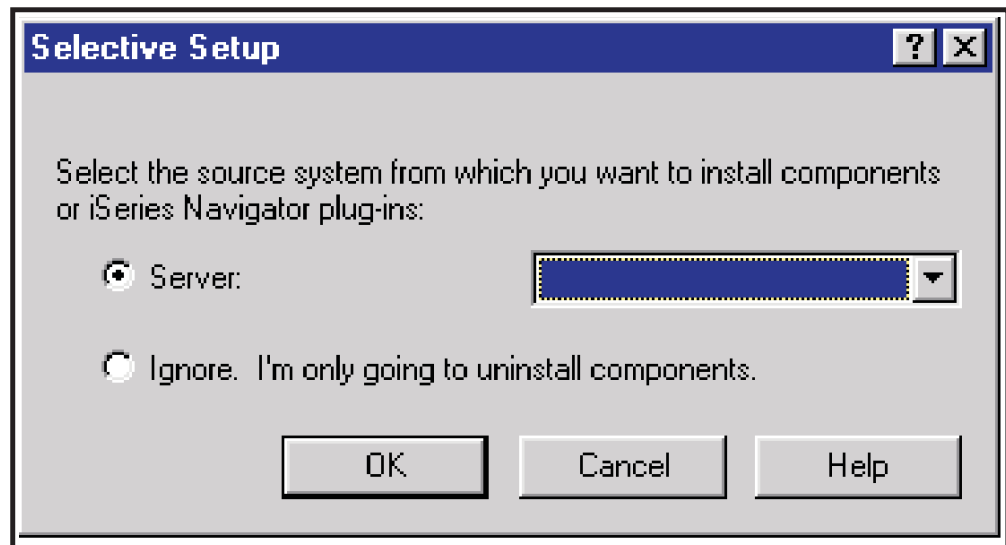
Figure 118. Selective Setup Window

6. The Selective Setup Wizard starts. Follow the directions on the screen. When the Component Selection window opens, all of the components installed on the specified iSeries server are selected. Scroll down and select **AFP Manager**. Click **Next** and follow the remaining directions.
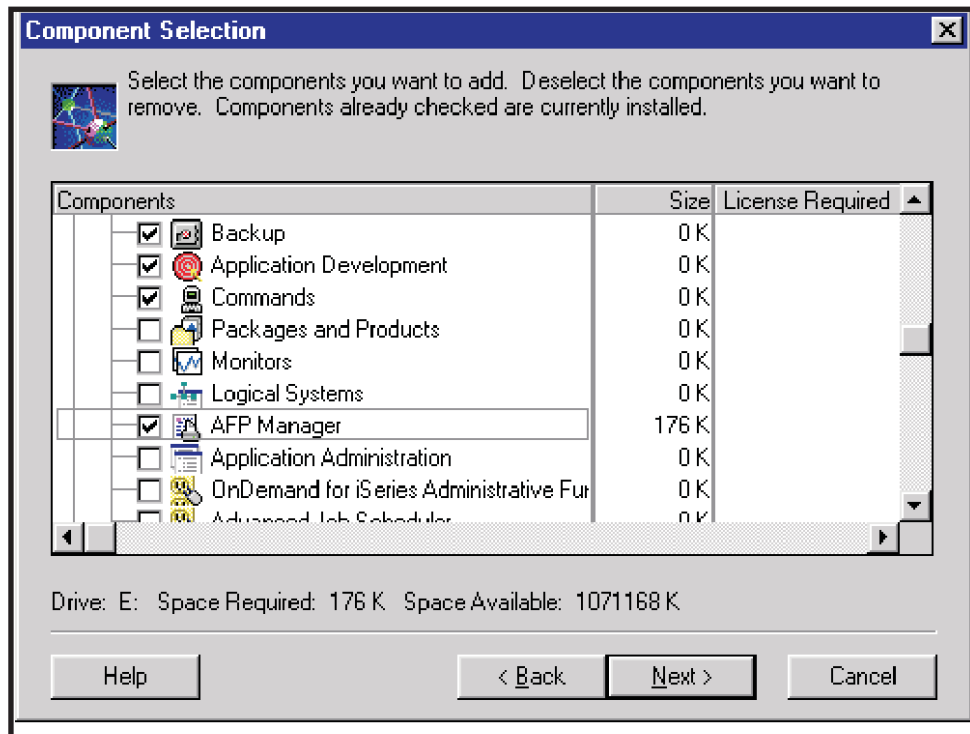
Figure 119. Component Selection Window

Converting a Spooled File to PDF for E-mailing, Spooling, or Storing

You can use AFP Manager to convert a spooled file to PDF then send it as e-mail, store it in the Integrated File System, or put it on an output queue.

Before you can invoke the PDF subsystem, you need these:

- A PSF configuration object that specifies that data is to be transformed to PDF. The PSF configuration object also specifies what is done with the PDF output. If your spooled file contains groups, use the PSF configuration object to specify whether the transform generates a separate PDF file for each group or one PDF file containing all of the data and index tags at group boundaries.
- A properly configured device that specifies the PSF configuration object on the "User defined object" parameter.

You might already have a PSF configuration object and properly configured device. Step 7 on page 231 describes how you can tell whether you have them.

To convert a spooled file to PDF, follow these steps:

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to an iSeries system.
4. Expand **Basic Operations**.
5. Open **Printer Output**.

6. From the list of printer output (spooled files), right-click the file you want to convert and select **Convert to PDF** as shown below.
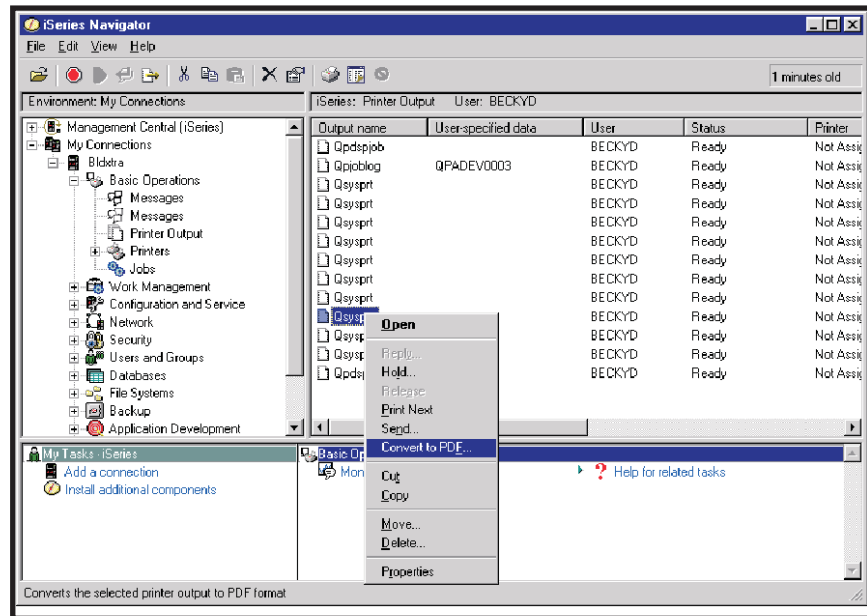
Figure 120. Selecting a Spooled File to Convert to PDF

7. The "Convert printer output to PDF" window opens, as shown in Figure 121 on page 232. Use these fields to specify what is done with the PDF, then specify the e-mail address to which the e-mail is sent, the directory to place the output in, or the output queue to place the output on, as appropriate.

    In the "Device for conversion" section, choose the printer to use to convert your output. If there are no devices listed, there are no appropriately configured devices.

    For help, press F1 or click **Help**.
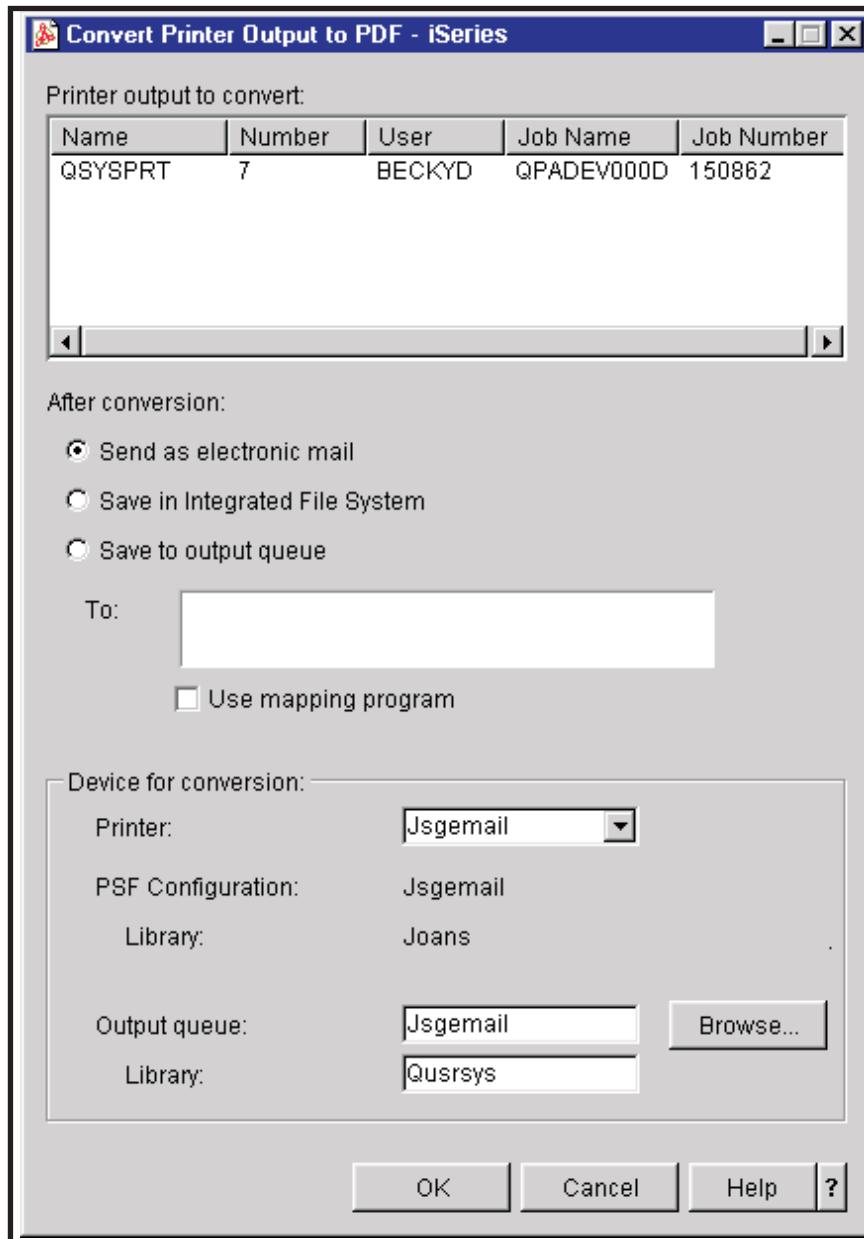
Figure 121. Convert Printer Output to PDF Window

8. Click **OK**.

Creating a PSF Configuration Object

This task requires AFP Manager. To create a PSF configuration object, follow these steps:

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to an iSeries system.
4. Expand **AFP Manager**.
5. Right-click **PSF Configurations** and select **New...**.

6. The window shown in Figure 122 opens. Fill in the fields as prompted. For help press F1 or click **Help**.
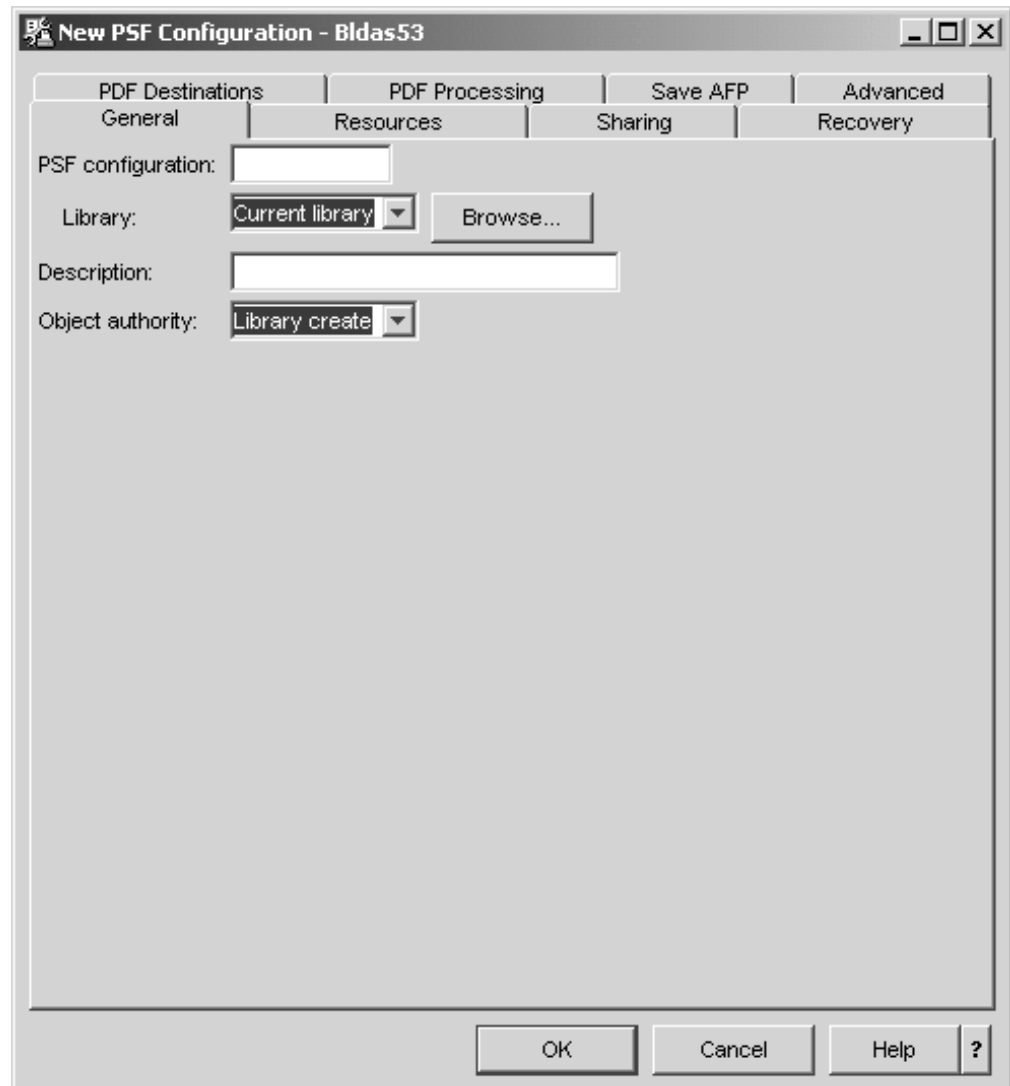
Figure 122. New PSF Configuration Window

7. Click **OK**.

Changing a PSF Configuration Object

This task requires AFP Manager. To change a PSF configuration object, follow these steps:

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to an iSeries system.
4. Expand **AFP Manager**.
5. Expand **PSF Configurations**.
6. Right-click the PSF configuration object you want to change and select **Configure**. The window shown in Figure 123 on page 234 opens, with the name of the PSF configuration object in the title.
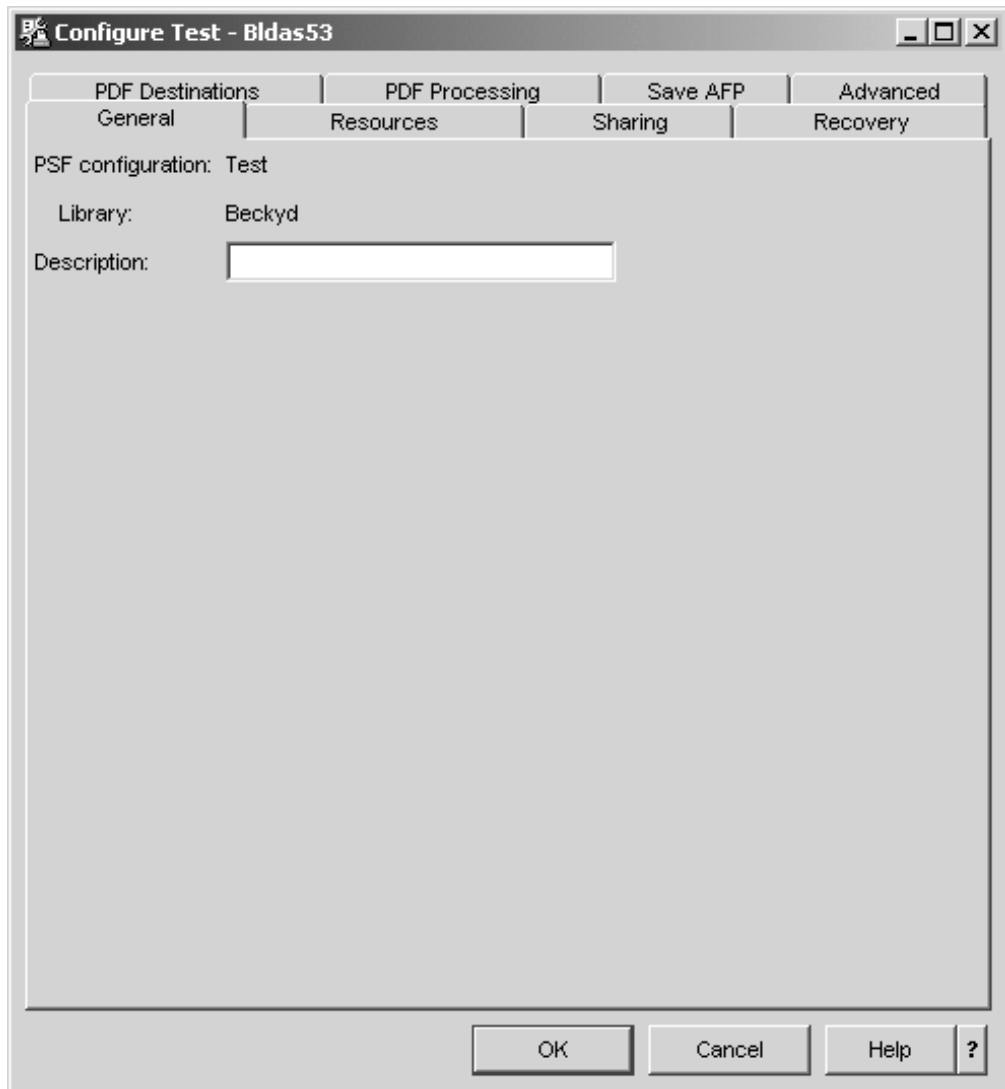
Figure 123. Configure PSF Configuration Window

7. Change any fields you want. For help press F1 or click **Help**.
8. Click **OK**.

Importing Resources to the i5/OS

You can use iSeries Access to import an AFP resources from your PC to the i5/OS. To do this, you need AFP Manager.

To use AFP Manager to import AFP resources to the i5/OS, follow these steps:

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to an iSeries system.
4. Expand **AFP Manager** then **Resources**.
5. Right-click the type of resource you want to store on the i5/OS, and select **Import**. A window like the one shown in Figure 124 on page 235 opens, depending on the type of resource you selected.
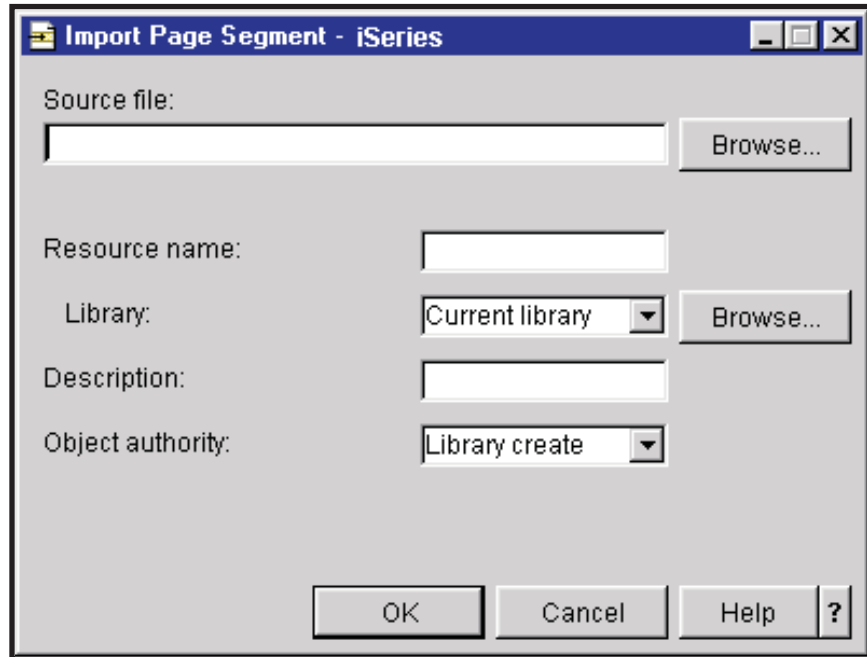
Figure 124. Import Page Segment Window

6. Fill in the fields as prompted. For help press F1 or click **Help**.

Creating a Printer Share

You can use iSeries Access to create a printer share on the i5/OS. If you have Infoprint Server installed and you specify a PostScript, PDF, or PCL printer driver, the printer share can be used to print PostScript, PDF[6], or PCL data that are generated by your PC application on AFP printers. For information about transforming PostScript, PDF, or PCL data to AFP data using Infoprint Server, refer to *Infoprint Server for iSeries: User's Guide*. To create a printer share, follow these steps:

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to an iSeries system.
4. Expand **Basic Operations** then **Printers**.
5. Right-click the printer you want to set up a share to and select **Sharing** then **New Share**, as shown below. If you want to use this printer share to print PCL, PDF, or PostScript data on an IPDS printer, be sure to select an IPDS printer.

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6. Printing PDF and PostScript data to an IPDS printer requires priced feature 5101.
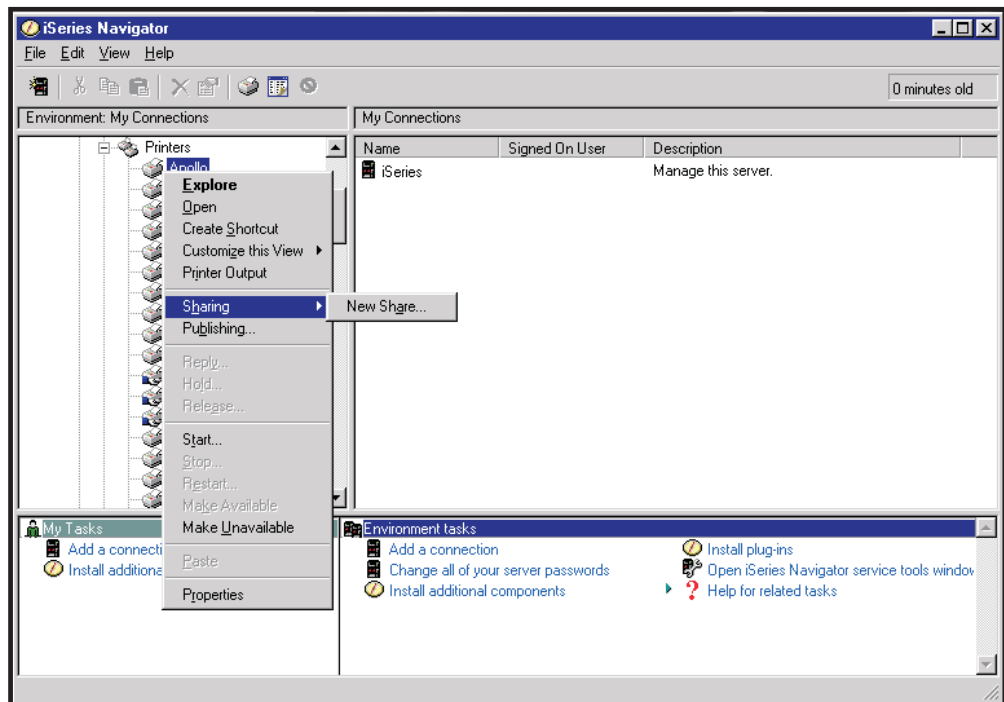
Figure 125. iSeries Access Components

6. The **iSeries NetServer Print Share** dialog opens, as shown in Figure 126 on page 237.
   - Specify a share name. This name should describe the type of job it will print (based on the printer file), such as legal or letter.
   - Give a detailed description of the share. This is optional.
   - Specify a driver. This is optional. If you specify a driver here, the driver must be available to you, and everyone who uses this share has to use this driver. If you do not specify a driver in this step, you have to specify one when you install the printer on your workstation.
   - Specify the library-qualified printer file this share uses.
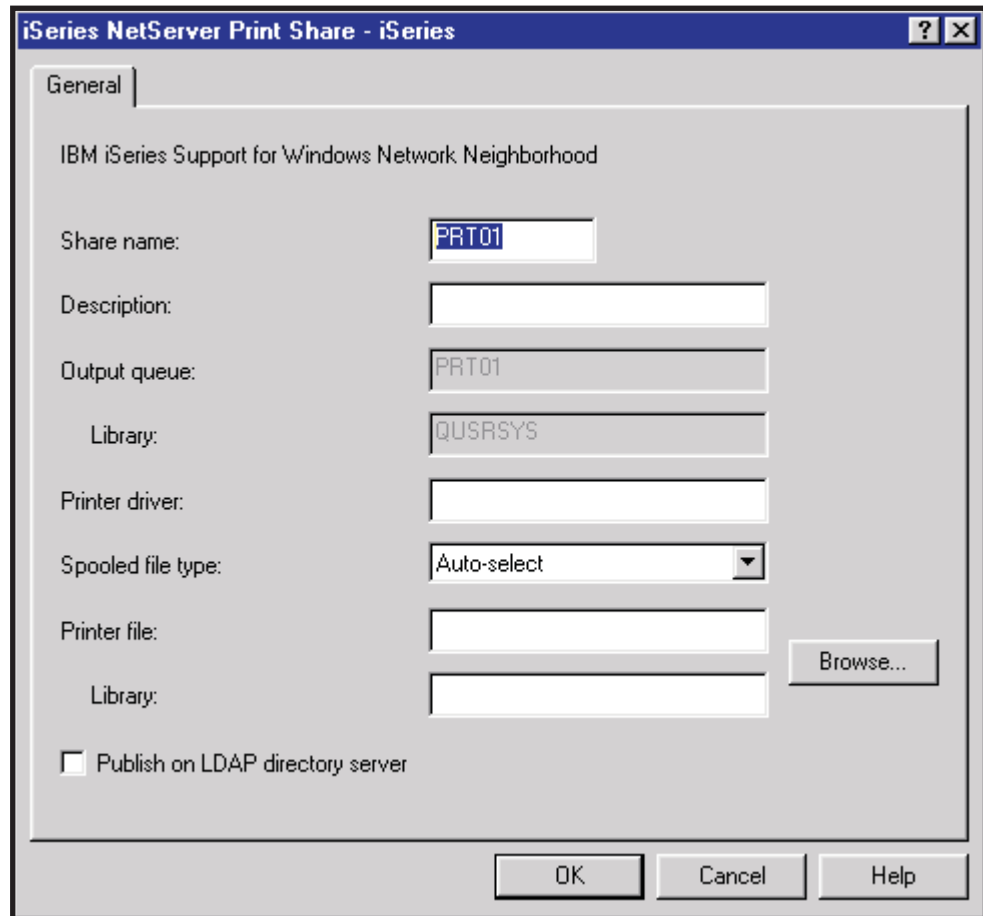
Figure 126. iSeries NetServer Print Share Dialog

7. Click **OK**.

Notes:

1. You can create multiple shares for the same printer.
2. You must create a different share for each printer file you want to use.
3. To transform jobs with this printer share, the printer device description must be configured appropriately.

You need to install the shared printer on your PC before you can use it.

Installing a Shared Printer

To install the printer on your PC, follow these steps.

Note: These steps are for a Windows NT operating system. The steps might be slightly different on different Windows operating systems. See the help for your operating system for steps to install a shared printer on a different operating system.

1. Display the printer shares on your iSeries by following these steps:
   a. On your Windows system, click **Start**, select **Find**, then select **Computer...**
   b. Enter the name of your iSeries and click **Find now**.
   c. When your iSeries is found, double-click the icon by its name to open it.
   d. All of the printers in the list are shared.
2. Right-click the printer share you want to install on your PC and select **Install**.

3. If you get the **Connect to Printer** message, click **OK** to install the driver on your PC.
4. Follow the steps in the **Add Printer** wizard. If you want to use this printer to print PCL, PDF, or PostScript data generated by your PC application, make sure that you specify a PCL, PDF, or PostScript driver.
5. The printer share shows up on your PC like any other printer. You can now send appropriate-type (depending on the driver you installed) PC jobs to this printer.

Specifying which Libraries to Display

When you display the contents of a container in iSeries Access, it displays the objects in the container's default library. To change the library used for display, follow these steps:

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to an iSeries system.
4. Expand the container whose objects you want to display.
5. From the **View** menu, select **Customize this view**, then **Include...**.
6. Select a library from the list or specify a name and click **OK**. The library you specify becomes the default library for this container.

Chapter 22. Indexing, Archiving, and Retrieving Output with Content Manager OnDemand for iSeries

Content Manager OnDemand for iSeries (hereafter referred to as CM OnDemand) is an application solution to store large volumes of data and retrieve selective data, whether on disk, optical, or tape storage media. It provides computer output to laser disk (COLD) and extended archiving functions for the iSeries. With Version 5, there are two archive server environments for iSeries; CM OnDemand Spool File Archive and CM OnDemand Common Server. Over time, CM OnDemand Common Server will become the standard iSeries archive middleware.

CM OnDemand:

- Provides a functionally rich, cost effective application solution to store and retrieve large volumes of data
- Gives users the ability to find a specific document that may have originated as just one small part of a large spooled file
- Extracts index values, and compresses and stores data on disk, optical, or tape storage media
- Manages the life cycle requirements of data and automatically moves data to the appropriate media
- Helps reduce cost by eliminating the need to print to paper or microfiche, improving the usability of report information, increasing productivity, and enhancing customer service capabilities
- Offers a powerful administration system for data definition, management, and security

For more information about CM OnDemand, refer to *IBM Content Manager OnDemand for iSeries Common Server Administration Guide*.

Super Sun Seeds Case Study

CM OnDemand complements the Super Sun Seeds invoicing application well, providing a comprehensive system to manage documents after they have been created. For example, a user can define the spooled file of Super Sun Seeds invoices to CM OnDemand then CM OnDemand can automatically index, compress, and archive them to disk, optical, or tape media. A user can then easily retrieve the information, down to the individual invoice.

A user can also reprint or fax an invoice (using Facsimile Support for iSeries, for example). This saves the Super Sun Seeds corporation money since they will not need to print multiple copies of invoices for their records, send the data to microfiche, or keep large spooled files on their iSeries. More significantly, CM OnDemand improves productivity and customer responsiveness by providing the capability for customer service representatives, for example, to view, print, and fax invoices right from their desks while speaking with customers. At the same time, management can analyze sales summary reports across multiple months, quarters, or years, viewing only certain product lines or geographic areas, as needed.

Defining the Invoices to CM OnDemand

This example shows how the invoice spooled file is defined to CM OnDemand using a graphical administration system. The graphical administration system

allows for point-and-click definition of index values and more, as well as setup of security authorizations, archive media, and "life of data" requirements.

The Super Sun Seeds invoices are defined to CM OnDemand one time, and then each time the spooled file of invoices is created (weekly or monthly, for example), it can be automatically captured and stored in CM OnDemand. There are a number of ways to automate the process so that no operator intervention is required.

Using the CM OnDemand Report Wizard is the most common way to begin the definition of the Super Sun Seeds invoices. The Report Wizard lets you define invoices to CM OnDemand in three steps:

1. Identify the type of spooled file data you are defining. In our Super Sun Seeds example, we choose AFP, as shown in Figure 127. CM OnDemand can store other data types as well, such as SCS, SCS-extended, Line, PDF, and "user-defined" data.
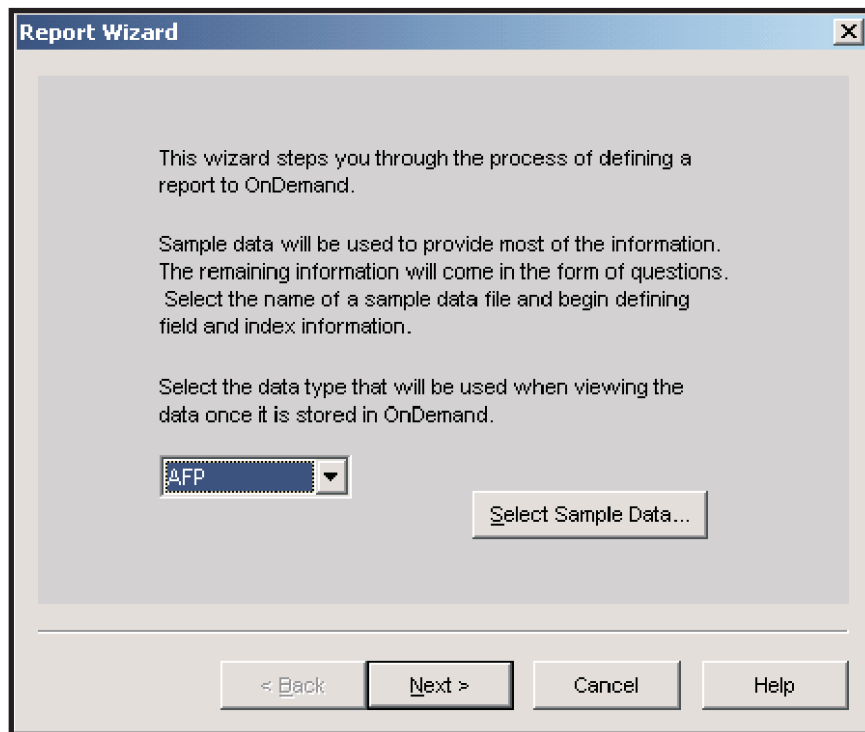
Figure 127. Starting the CM OnDemand Report Wizard

2. Invoke the graphical tool that lets you copy an iSeries spooled file down to your workstation so you can point-and-click to mark your actual iSeries print data.
3. Mark the index fields you require. The marking technique also lets you control how CM OnDemand separates the spooled file pages into individual invoices. The following section takes you through this process.

In the Super Sun Seeds example, you first use the Wizard to copy a spooled file of invoices to your workstation. Then you define the invoice number as a "trigger", which can be used to tell CM OnDemand how to break up the spooled file into separate, multi-page invoices. CM OnDemand does not care how many pages belong to each invoice - that number can vary - as long as you tell CM OnDemand

how to determine when one invoice ends and the next one begins within the spooled file. CM OnDemand does this "segmenting" so that users can retrieve a specific invoice rather than scrolling through the entire spooled file to find a particular one.

To define the invice number as a trigger, highlight the invoice number, right-click, and select **Trigger**. This opens the "Add a Trigger" window. Figure 128 shows the trigger definition.
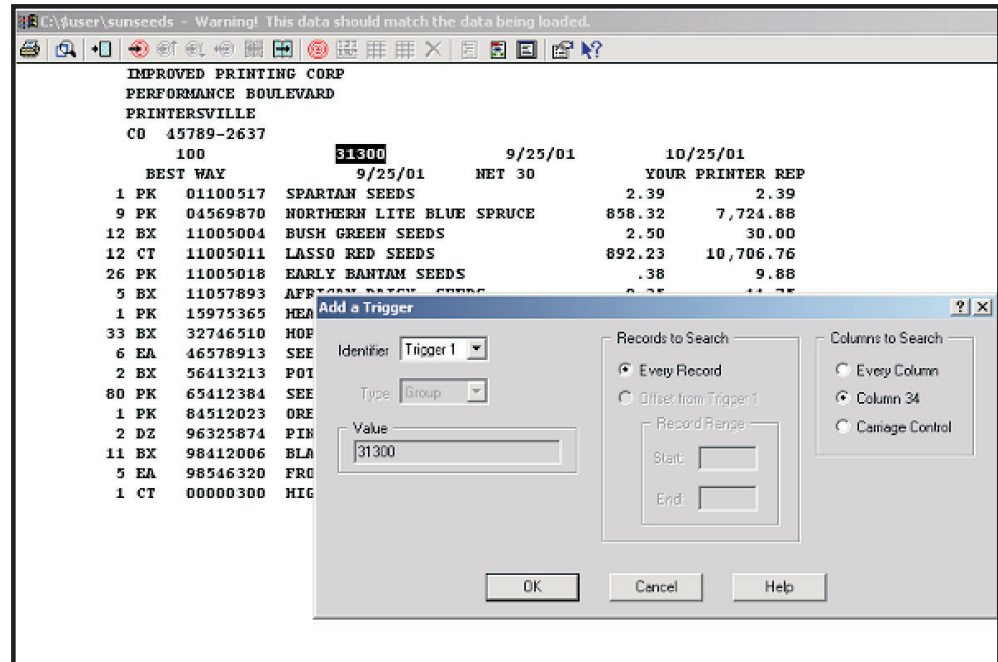
Figure 128. Adding a Trigger

Next, define the index fields, by marking the data that you want to be able to use for searching. Even if the index value is not always on the same line or in the same column within the invoice, CM OnDemand can find it.

You can define up to 32 index fields. In the example, you would mark invoice date, invoice number, customer number, and customer name. You can also define fields that would not typically be used for searching, but might be valuable for an end-user to see along with the index values on the hit list that results after entering invoice search criteria. In this example, we use invoice amount in this way.

To define the customer name as an index field, highlight the customer name, right-click, and select **Field**. The "Add a Field" window opens, as shown in Figure 129 on page 242. The customer name in this example is IMPROVED PRINTING CORP. Notice that "Index" was selected as the Database Field Type. The Folder Field Name is used with the Search Criteria and Document List, presented later.
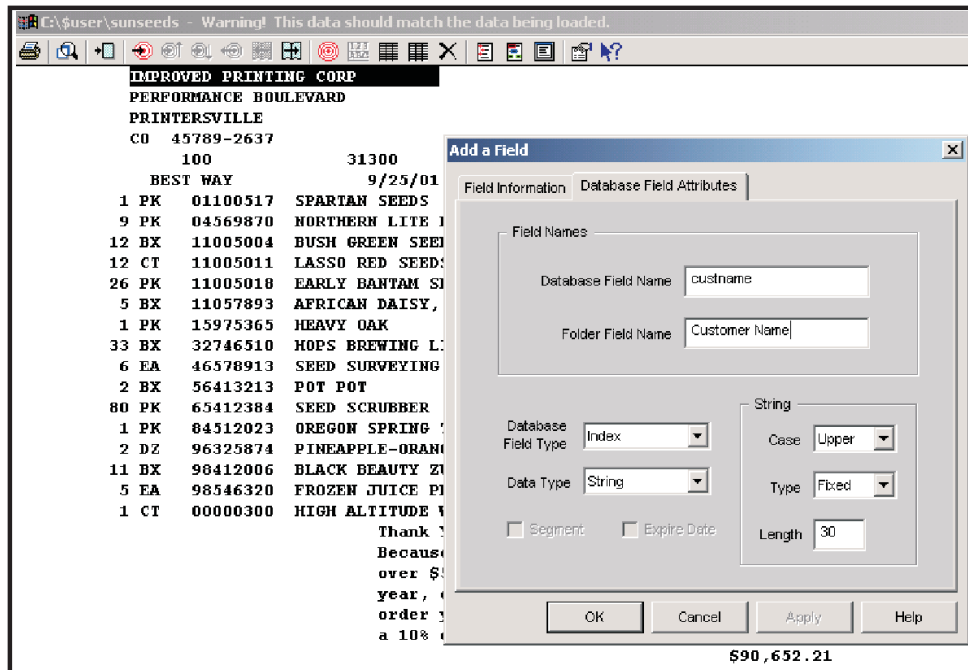
Figure 129. Defining an Index Field

After you have told CM OnDemand how to identify individual invoices and defined all your index fields, you use the Wizard to tell CM OnDemand what type of media and archive time frames you require. Then you name the definition; this is the name that your end users will use when they search the CM OnDemand archive for the invoices. In our example, we will use the name SUNSEEDS.

Retrieving the Archived Invoices from CM OnDemand

Once the invoices are stored, the real value of CM OnDemand becomes obvious, providing the capability to quickly find any invoice ever stored. Once found, an invoice can easily be viewed, printed, or faxed using the CM OnDemand Client.

After logging on to the server using the dialog box that appears when you click the CM OnDemand icon on your workstation desktop, a list appears with folders (reports) to which you are authorized. Figure 130 on page 243 shows a folder list.
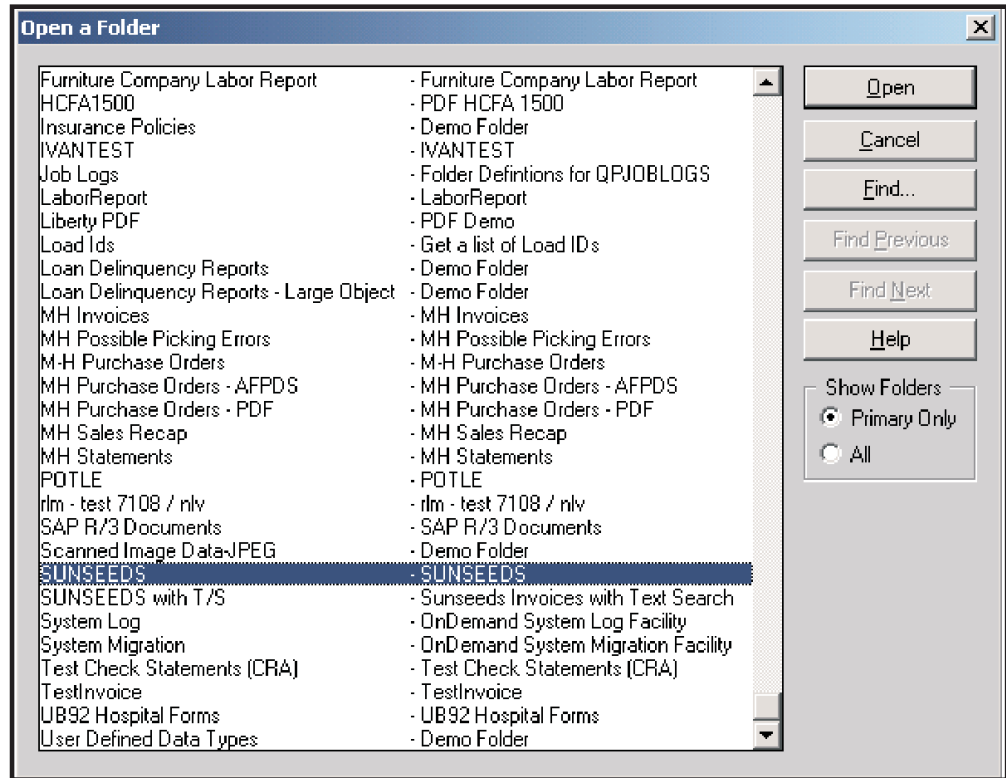
Figure 130. List of Folders

As a user searching for an invoice, the first step is to tell CM OnDemand what you are looking for. In the case study, you are looking for SUNSEEDS invoices, so double-click the SUNSEEDS folder, or select it and click **Open**.

On the resulting window, shown in Figure 131 on page 244, enter the search criteria needed to locate the archived invoices you want to retrieve. You might know the actual invoice number or you might need to review all the invoices for a particular customer number or customer name for the last six months (by expanding the date range).

To save keystrokes, you can use the Like operator with a "wildcard" (%) value. For example, you can enter IMP% for the customer name with the Like operator. This tells CM OnDemand to find any invoices for customers with names beginning with IMP (such as IMPROVED PRINTING CORP). Or, if you need to find all invoices for a particular date that were greater than a certain dollar amount, you can click on the operator button by Invoice Amount to see all available comparison operators (such as Equal To, Not Equal To, Like, Between, Greater Than, and Less Than) and choose Greater Than.
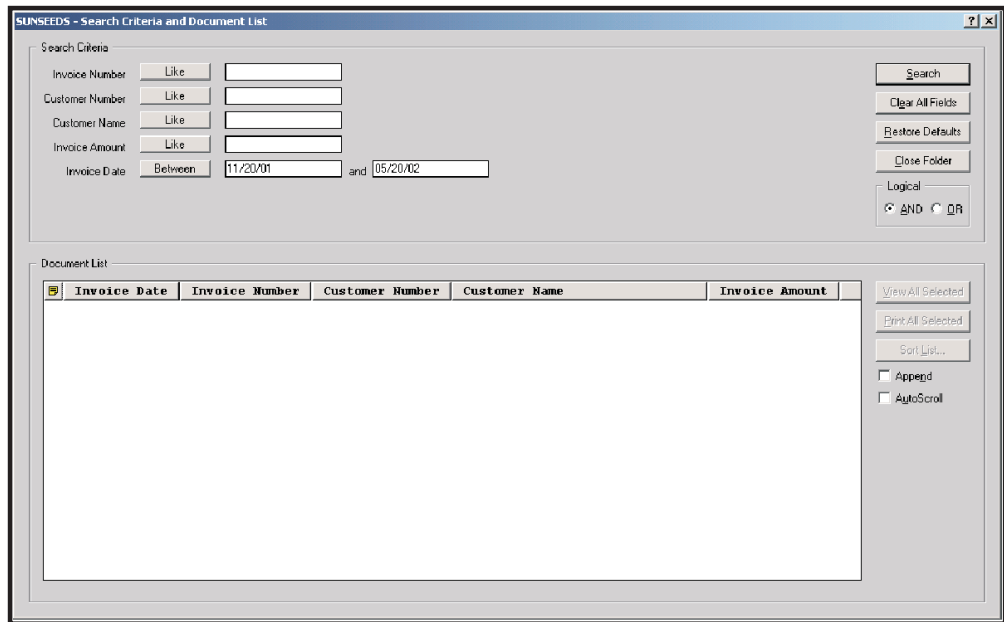
Figure 131. The Search Window

When you have entered your search criteria and chosen your search operator, click **Search**. CM OnDemand fills the documents list with the documents that satisfy your search criteria, as shown in Figure 132. Notice that this display shows the index values (invoice date, invoice number, customer number, and customer name) and the informational field (invoice amount).

It is possible that you can answer a significant number of customer inquiries about invoices simply by using this panel to tell a customer the total invoice amount, and then faxing or reprinting a copy for him.
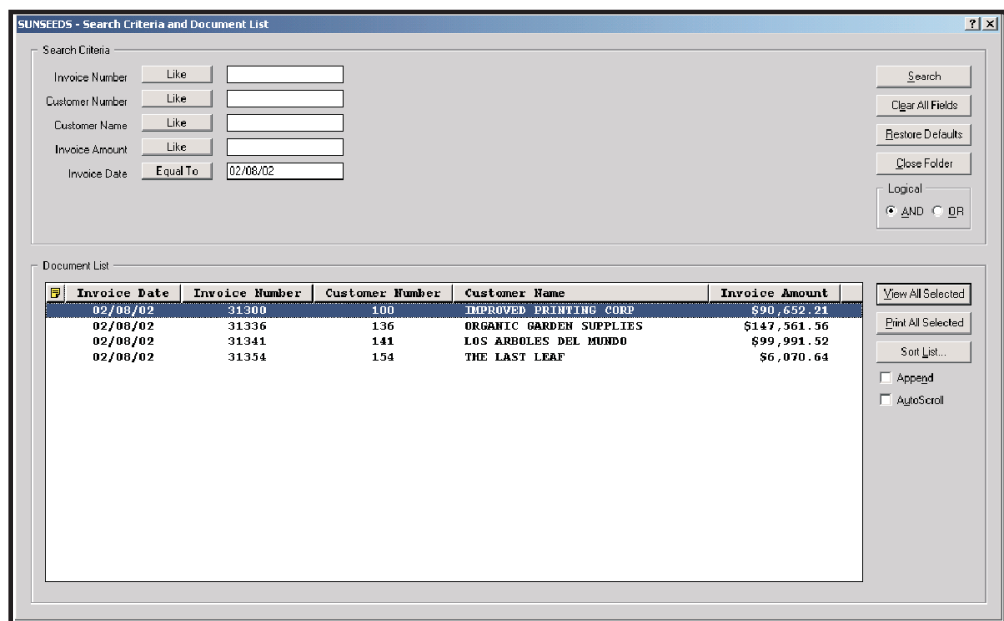
Figure 132. List of Invoices that Meet Search Criteria

From this list, you can either choose a single document to view or select multiple documents to view simultaneously. Figure 133 shows the selected invoice for Improved Printing Corporation in the viewer.
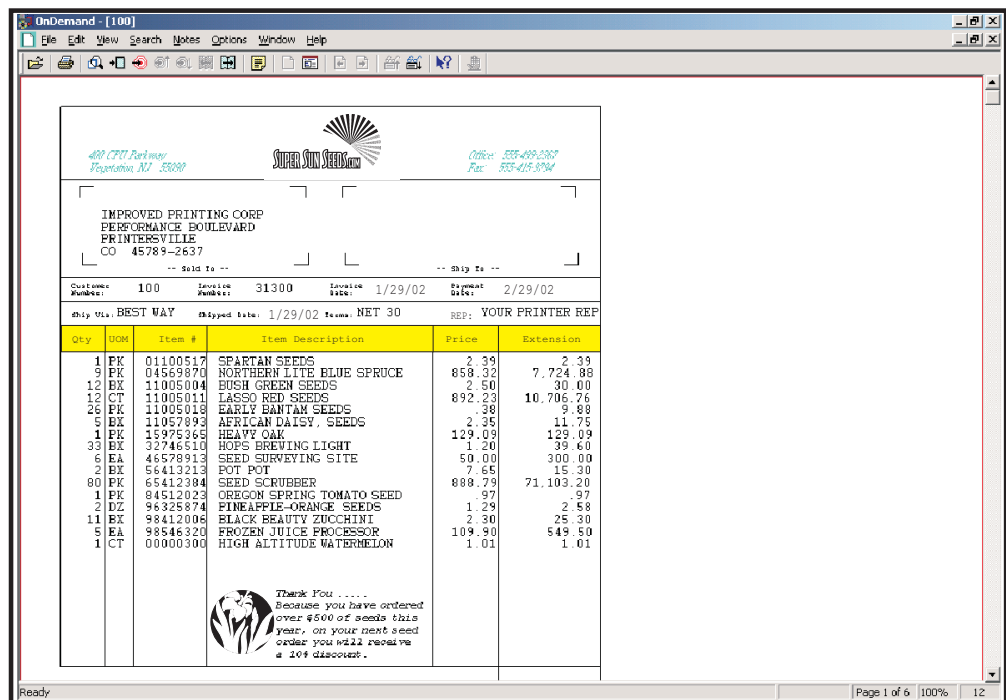
Figure 133. Viewing an Invoice

The invoice, in its fully-resolved form, can be reprinted or faxed, if available, from the workstation or the iSeries server.

Chapter 23. Deciding on an Output Strategy and Set of Tools

We've covered a lot of territory, using our SuperSunSeeds.com case study to explore various tools for creating, printing, and delivering documents and reports. While you may have already mapped out your approach, here are several summary looks at the tools that might assist your decision.

First, let's take a look from a task perspective. Table 14 lists tasks you might want to accomplish and then gives a recommendation of what is the best tool to address that task. These Web pages are referenced in the table below:

IBM Printing Systems Professional Services Web page:

`http://www.printers.ibm.com/internet/wwsites.nsf/vwWebPublished/ecshome_ww`

iSeries Access for Web home page:

`http://www-1.ibm.com/servers/eserver/iseries/access/web/`

Table 14. Recommended Approaches — by Task

Task	Recommended Approach	Where Can I Find Information?
Work with images		
Deploy one logo	• IBM AFP Printer Driver • IBM or similar printing services	• "Creating an Image Resource with the IBM AFP Printer Driver for Windows" on page 103 • IBM Printing Systems Professional Services Web page
Create efficient, high-performing iSeries images or perform ongoing image content work in iSeries applications	Infoprint Designer (Image Editor)	• Chapter 16, "Using Infoprint Designer," on page 165 • *Infoprint Designer for iSeries: Getting Started*
Complex embedding of images within documents such as bank statements	Design tools such as DOC1 or StreamServe	Appropriate product documentation
Transform images to AFP	Infoprint Server	*Infoprint Server for iSeries: User's Guide*
Work with overlays		
Deploy one overlay	• IBM AFP Printer Driver • IBM or similar printing services	• "Creating an Image Resource with the IBM AFP Printer Driver for Windows" on page 103 • IBM Printing Systems Professional Services Web page
Add an overlay on top of existing application output	Printer file	Chapter 14, "Using Printer Files," on page 133
Create and work with PDF		
Produce PDF	Infoprint Server	• *Infoprint Server for iSeries: User's Guide* • *IBM @server iSeries Printing VI: Delivering the Output of e-business*

Table 14. Recommended Approaches — by Task (continued)

Task	Recommended Approach	Where Can I Find Information?
Produce PDF and e-mail, including electronic segmentation	Infoprint Server	• *Infoprint Server for iSeries: User's Guide* • *IBM @server iSeries Printing VI: Delivering the Output of e-business*
Produce and work with PDF using iSeries Access	iSeries Access (requires Infoprint Server)	• "Converting a Spooled File to PDF for E-mailing, Spooling, or Storing" on page 230 • *Infoprint Server for iSeries: User's Guide*
Produce and work with PDF using iSeries Access for Web	iSeries Access for Web (uses Infoprint Server if installed)	• "Using iSeries Access for Web to Convert and View a Spooled File in PDF" on page 225 • iSeries Access for Web home page
Other		
Reengineer existing application output	Infoprint Designer (all editors)	• Chapter 16, "Using Infoprint Designer," on page 165 • *Infoprint Designer for iSeries: Getting Started*
Add 2D bar codes	• DDS • IBM or similar services (for font implementation)	• "Specifying Bar Codes with DDS" on page 115 • Chapter 16, "Using Infoprint Designer," on page 165 • IBM Printing Systems Professional Services Web page
Format variable dynamic paragraphs	Design tools such as DOC1 or StreamServe	Appropriate product documentation
Produce portable AFP for electronic distribution	Infoprint Server (requires AFP Viewer for viewing)	*Infoprint Server for iSeries: User's Guide*
Convert PCL, PostScript, and PDF files to AFP	Infoprint Server	*Infoprint Server for iSeries: User's Guide*
Print to IPDS printers	PSF	iSeries Information Center

Next, let's look at the formatting tools and break them down by key characteristics. With this perspective, you see that, for example, there may be certain applications for which DDS is the best fit, but DDS requires access to the application source code and programming resources. In contrast, Infoprint Designer can be used by a non-technical person and does not require access to source code or programming.

Table 15. Comparing iSeries Formatting Approaches

	Printer File	DDS	Infoprint Designer
Designed for Non-IT User: Someone without programming skills can use it.	X		X
Application Independent: Does not require recompile or change to existing application.	X		X
Dynamic Data Positioning: Position of data can vary from page to page		X	X
Complex Documents: Able to support the full range of electronic documents, including overlays, fonts, bar codes, and images.		X	X
Standard Bar Codes: Lets you map variable data as a standard bar code.		X	X
2D Bar Codes: Supports 2D barcodes such as PDF417, UPS Maxicode, and Data Matrix.		X	
Integrated, One-Pass Formatting: Does not require monitor and separate print engine.	X	X	X

Finally, let's go over each iSeries output tool and summarize the application or applications that it is the best fit for.

Table 16. Best Application of Each Tool

Tool	Application
DDS	Formatting complex, dynamic pages
Infoprint Designer	General purpose output design, without application changes
Infoprint Server	• Deliver output electronically • Format PC images for use in iSeries documents • Create Internet-ready AFP • Convert PostScript, PCL, and PDF to AFP
iSeries Access	Accessing PDF and e-mail functions interactively
Printer File	Adding an overlay on top of a printed page
PSF	Required for printing to IPDS printers

Part 4. Appendixes

Appendix A. iSeries Font Libraries

These are the system font libraries:

QFNTCPL
> This library is shipped with the operating system and contains the 240-pel compatibility set of fonts. (Look for **OS/400 - AFP Compatibility Fonts** in your licensed program list.) All other font libraries are part of IBM AFP Font Collection.

QFNT01-QFNT19
> QFNT01-QFNT15 are used if you purchase and install certain iSeries single-byte character set font licensed program products. These libraries contain only 240-pel fonts.

QFNT61-QFNT69
> QFNT61-QFNT65 are used if you purchase and install certain iSeries double-byte character set font licensed program products. These libraries contain only 240-pel fonts.

240 and 300 pel fonts can be in the same library if they have unique names. If you have the same font with the same name at both 240 and 300 pel, they need to be in separate libraries.

The IBM AFP Font Collection contains libraries that can be restored into system font libraries. The libraries are listed below:

QFNTCDEPAG	Expanded code pages
QFNTCPL	240–pel Compatibility fonts
QFNTCF_ARA	Arabic coded fonts
QFNTCF4ARA	4-character Arabic coded fonts
QFNT240ARA	240-pel Arabic character sets
QFNT300ARA	300-pel Arabic character sets
QFNT300CPL	300-pel Compatibility fonts
QFNTCF_CYR	Cyrillic Greek coded fonts
QFNTCF4CYR	4-character Cyrillic Greek coded fonts
QFNT240CYR	240-pel Cyrillic Greek character sets
QFNT300CYR	300-pel Cyrillic Greek character sets
QFNTCF_HEB	Hebrew coded fonts
QFNTCF4HEB	4-character Hebrew coded fonts
QFNT240HEB	240-pel Hebrew character sets
QFNT300HEB	300-pel Hebrew character sets
QFNTCF_OCR	OCR coded fonts
QFNTCF4OCR	4-character OCR coded fonts
QFNT240OCR	240-pel OCR character sets
QFNT300OCR	300-pel OCR character sets
QFNTCF_APL	APL coded fonts
QFNTCF4APL	APL 4-character coded fonts
QFNT240APL	240-pel APL character sets
QFNT300APL	300-pel APL character sets
QFNTCF_KAT	Katakana coded fonts
QFNTCF4KAT	Katakana 4-character coded fonts
QFNT240KAT	240-pel Katakana character sets
QFNT300KAT	300-pel Katakana character sets
QFNTCF_LA1	Latin1 coded fonts

QFNTCF4LA1	4-character Latin1 coded fonts
QFNT240LA1	240-pel character sets for typographic fonts, such as Helvetica and Times New Roman
QFNT300LA1	300-pel character sets for typographic fonts, such as Helvetica and Times New Roman
QFNTCF_LA2	Latin2/3/4/5 coded fonts
QFNTCF4LA2	4-character Latin2/3/4/5 coded fonts
QFNT240LA2	240-pel Latin2/3/4/5 character sets
QFNT300LA2	300-pel Latin2/3/4/5 character sets
QFNTCF_SYM	Symbols coded fonts
QFNTCF4SYM	4-character Symbols coded fonts
QFNT240SYM	240-pel Symbols character sets
QFNT300SYM	300-pel Symbols character sets
QFNT240LAO	240–pel Lao character sets
QFNT300LAO	300–pel Lao character sets
QFNTCF_LAO	Lap coded fonts
QFNTCF4LAO	4–character Lao coded fonts
QFNTOLNLAO	Lao AFP outlines
QFNTCFOLAO	Coded fonts for Lao AFP outlines
QFNTCO4LAO	4–character coded fonts for Lao outlines
QFNTCF_TAI	Thai coded fonts
QFNTCF4TAI	4-character Thai coded fonts
QFNT240TAI	240-pel Thai character sets
QFNT300TAI	300-pel Thai character sets
QFNTOLNTAI	Thai AFP outlines
QFNTCFOTAI	Coded fonts for Thai AFP outlines
QFNTCO4TAI	4–character coded fonts for Thai outlines
QFNT240BM	240-pel BookMaster® character sets
QFNT300BM	300-pel BookMaster character sets
QFNTOLNAPL	APL AFP outlines
QFNTCFOAPL	Coded fonts for APL AFP outlines
QFNTCO4APL	4-character coded fonts for APL AFP outlines
QFNTOLNARA	Arabic AFP outlines
QFNTCFOARA	Coded fonts for Arabic AFP outlines
QFNTCO4ARA	4-character coded fonts for Arabic AFP outlines
QFNTOLNBM	BookMaster AFP outlines
QFNTOLNCYR	Cyrillic Greek AFP outlines
QFNTCFOCYR	Coded fonts for Cyrillic Greek AFP outlines
QFNTCO4CYR	4-character coded fonts for Cyrillic Greek AFP outlines
QFNTOLNHEB	Hebrew AFP outlines
QFNTCFOHEB	Coded fonts for Hebrew AFP outlines
QFNTCO4APL	4-character coded fonts for Hebrew AFP outlines
QFNTOLNKAT	Gothic Katakana AFP outlines
QFNTCFOKAT	Coded fonts for Gothic Katakana AFP outlines
QFNTCO4KAT	4-character coded fonts for Gothic Katakana AFP outlines
QFNTOLNLA1	Latin1 AFP outlines
QFNTCFOLA1	Coded fonts for Latin AFP outlines
QFNTCO4LA1	4-character coded fonts for Latin1 AFP outlines
QFNTOLNLA2	Latin2/3/5 AFP outlines
QFNTCFOLA2	Coded fonts for Latin2/3/5 AFP outlines
QFNTCO4LA2	4-character coded fonts for Latin2/3/5 AFP outlines
QFNTOLNOCR	OCR AFP outlines
QFNTCFOOCR	Coded fonts for OCR AFP outlines

QFNTCO4OCR	4-character coded fonts for OCR AFP outlines
QFNTOLNSYM	Symbols AFP outlines
QFNTCFOSYM	Coded fonts for Symbols AFP outlines
QFNTCO4SYM	4-character coded fonts for Symbols AFP outlines

An example of a working set of font libraries for a standard English installation might include these libraries:

- QFNTCPL
- QFNTCDEPAG
- QFNTCPL300
- QFNT240LA1
- QFNT300LA1
- QFNT240SYM
- QFNT300SYM
- QFNTCF
- QFNTOLNLA1
- QFNTOLNSYM

If you were using only outline fonts, then the font libraries would be:

- QFNTCDEPAG
- QFNTCF
- QFNTOLNLA1
- QFNTOLNSYM

Note that you can name the font libraries however you choose, these are just recommendations. What is important is that the user and resource library lists used by your applications refer to the needed libraries.

Appendix B. Additional DDS Examples

Chapter 15, "Using Data Description Specifications," on page 137 showed the Super Sun Seeds invoicing with the INVNEW1 program. This example provided a nice electronic invoice, including the tailoring of the invoice pages to the application data. The chapter closed with a discussion of several enhancements that could be made to the invoicing application.

In the following sections, two different invoicing applications, INVNEW2 and INVNEW3, are shown and described. INVNEW2 provides for multiple copies, duplex, and price suppression. INVNEW3 illustrates the use of a floating form, precisely tailoring the invoice form to the data.

Figure 134 shows a sample of the output for INVNEW2.

Figure 134. INVNEW2 Sample Invoice

INVNEW2 Enhanced Super Sun Seeds Invoicing

In order to produce multiple collated copies of each page, the invoice detail must be stored. Once each logical page is complete, the customer copy, packing list, and file copy can be printed. If you are using Infoprint Designer as your output design interface, you do not need to worry about multiple, collated copies - that is

handled automatically. As each detail record in the invoice file (SEEDDETL) is processed, the fields for the invoice detail line are stored in the DETDS data structure instead of being printed. This data structure stores up to 48 detail lines. A page is completed either through overflow (38 detail lines for page one, 48 details line for a continuation page) or through end of the customer invoice.

The fields PAGCNT and PAGTYP keep track of the page number and page type, and in combination, determine what kind of page is being printed. INVNEW2 executes the subroutine PAGSR for each page to be printed (customer copy, packing list, and file copy). In turn, the subroutine PRTDET is called to print the invoice line items out of the DETDS data structure. Indicator 51, set for the packing list, controls the suppression of the price and extension fields. A terms and conditions overlay (INVBAC) is printed only on the back of the customer copy. After all the copy pages have been printed, subroutine BLKDET is called to blank the DETDS data structure.

INVNEW2 RPG Source

The RPG source for INVNEW2 is as follows:

```
5722WDS V5R2M0                    SEU SOURCE LISTING              11/11/03 17:47:37         1
SOURCE FILE . . . . . . .  SAMPLER/QRPGSRC
MEMBER  . . . . . . . . .  INVNEW2
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
  100      * INVNEW2 - Super Sun Seeds Electronic Invoice
  200      *          Example 2
  300      *
  400      * This is an enhancement to INVNEW1 that adds the following
  500      * output functionality:
  600      *
  700      *    1. Multiple copies of invoice with routing designation -
  800      *       "Customer Copy", "Packing List", "File Copy"
  900      *    2. Overlay specifying terms and conditions to print on back of
 1000      *       customer copy.
 1100      *    3. Packing List copy suppresses price information.
 1200      *
 1300      * This program reads a transaction file (SEEDDETL), retrieves info
 1400      * from item master (SEEDITEM) and customer master (SEEDCUST), then
 1500      * prints invoices.
 1600      *
 1700      * Different electronic overlays are used depending on whether this
 1800      * is a one page or multi-page invoice, as well as whether there is
 1900      * room remaining on the invoice to print a customer offer.  The following
 2000      * overlays are used:
 2100      *
 2200      *    INVALL     1-page invoice (full address at top, payment at bottom)
 2300      *    INVFST     Page 1 of multi-page invoice (no payment at bottom)
 2400      *    INVMID     Continuation page (No address, payment at bottom)
 2500      *    INVLST     Last page of multi-page invoice
 2600      *    INVBAC     Back side Terms and Conditions overlay
 2700      *
 2800      * Invoice detail lines are processed until either end of customer order
 2900      * or end of the page (38 lines for page 1 and 48 lines for continuation
 3000      * pages), at which time the invoice page is printed.  At end of
 3100      * order, a check is made to see if there are more than 18 detail lines
 3200      * to print.  If there are, that would not leave room in the invoice body
 3300      * to print the customer offer.  In this case, the page is printed, and a
 3400      * new final page is built with the offer and the payment coupon.
 3500      *
 3600      * The offer is a message (and corresponding image, or page segment) based
 3700      * on item sales in the customer master.  For example, a flower image
 3800      * would print if seed sales exceeded $500.
 3900      *
 4000      * ENHANCEMENTS:
 4100      * ============
```

```
4200     *    Electronic printing offers wide opportunities for increasing
4300     *    the value of your documents.  Several additional enhancements
4400     *    that could be made to Example 2 include:
4500     *
4600     *       1. Use of "floating" forms.  With DDS dynamic positioning of
4700     *          document elements (ie. line, box, segment, overlay, etc.),
4800     *          the invoice information could be floated.  This means that
4900     *          the grid for detail lines is drawn as transactions are
5000     *          processed, and the grid is closed at the end of a specific
5100     *          customer's transactions.  All other document elements
5200     *          could be similarly floated.
5300     *       2. Use of multiple input and output bins of the printer to
5400     *          utilize different stock for different pages.  For example,
5500     *          the packing list might use stock that embeds a barcoded
5600     *          packing label on it.
5700     *
5800     FSEEDDETLIP  E            K         DISK
5900     FSEEDITEMIF  E            K         DISK
6000     FSEEDCUSTIF  E            K         DISK
6100     FINVNEW2 O   E                      PRINTER
6200     *
6300     E                  WDS     1 40 24              Text for Offer
6400     E                  CPY     1  3 25              Text for Copy
6500     *
6600     IINVCDETL    01
6700     I                                         STNAME          32
6800     I                                         CUST# L1
6900     ICUSTDATA    02
7000     IITEMDATA    03
7100     *
7200     * Data structure to store up to 48 detail lines
7300     *
7400     IDETDS      DS                        48
7500     I                              1    40QTY
7600     I                              5   6 UOM
7700     I                              7  140ITEM#
7800     I                             15  39 ITMDES
7900     I                             40  452SELPRC
8000     I                             46  522EXTPRC
8100     *
8200     IBARTOT     DS
8300     I                              1   60CUST#
8400     I                              7  152TOTDUE
8500     *
8600     IPAYDAA     DS
8700     I                              1   20PAYMO
8800     I                              3   40PAYDA
8900     I                              5   60PAYYR
9000     *
9100     * First pass only
9200     *
9300     C            *IN90    IFEQ '0'
9400     C                     SETON                        90
9500     C                     EXSR DATESR
9600     C                     EXSR BLKDET
9700     C                     MOVEL'Page'    PAGCON  4
9800     C                     ENDIF
9900     *
10000    * Start of Customer
10100    *
10200    C            *INL1    IFEQ '1'
10300    C            CUST#    ADD  31200     INVC#   60      Invent Invoice#
10400    C                     Z-ADD0         TOTDUE  92      Reset Totals/Ctrs
10500    C                     Z-ADD0         ITMCNT  30
10600    C                     Z-ADD0         PAGCNT  20
10700    C                     MOVEL' '       PAGTYP  3
10800    C            CUST#    CHAINSEEDCUST          20      Get Cust Master
```

```
10900    C    32              MOVEL'    Same'STNAME          Ship to Name Is Blank
11000    C                     SETOF                    30
11100    C                     Z-ADDZIP      ZIPPN  90
11200    C                     ENDIF
11300      *
11400      * Process invoice detail
11500      *
11600    C         *IN01       CABNE'1'      ENDDET          Item Processing
11700    C                     Z-ADD0        SELPRC
11800    C         ITM1        CHAINSEEDITEM           21
11900    C         *IN21       CABEQ'1'      ENDDET
12000    C*
12100    C                     ADD  1        ITMCNT
12200    C                     Z-ADD0        EXTPRC
12300    C         QTY1        MULT SELPRC   EXTPRC 72
12400    C                     Z-ADDQTY1     QTY    40
12500    C         EXTPRC      ADD  TOTDUE   TOTDUE
12600    C*
12700    C         ITMCNT      OCUR DETDS                    Set up DS
12800    C*
12900    C         PAGCNT      IFEQ 0
13000    C         ITMCNT      CABLT38       ENDDET          38 lines on Page 1
13100    C                     ELSE
13200    C         ITMCNT      CABLT48       ENDDET          48 lines on Page n
13300    C                     ENDIF
13400    C*
13500    C                     MOVEL'OF '    PAGTYP  3
13600    C                     MOVELCPY,1    PAGNAM 25
13700    C                     ADD  1        PAGCNT
13800    C                     EXSR PAGSR                    Print Cust Copy
13900    C*
14000    C                     SETON                    51
14100    C                     MOVELCPY,2    PAGNAM 25
14200    C                     EXSR PAGSR                    Packing List
14300    C                     SETOF                    51
14400    C*
14500    C                     SETON                    52
14600    C                     MOVELCPY,3    PAGNAM 25
14700    C                     EXSR PAGSR                    File Copy
14800    C                     SETOF                    52
14900    C*
15000    C                     Z-ADD0        ITMCNT
15100    C                     MOVE '   '    PAGTYP          Reg or OF Page Type
15200    C                     EXSR BLKDET
15300    C         ENDDET      TAG
15400    C*
15500    C* End of Customer Invoice
15600    C*
15700    CL1       ITMCNT      IFGT 18                       No Room for PSEG
15800    CL1                   MOVE 'OF '    PAGTYP          OF page
15900    CL1                   MOVELCPY,1    PAGNAM 25
16000    CL1                   ADD  1        PAGCNT
16100    CL1                   EXSR PAGSR                    Customer Copy
16200    C*
16300    CL1                   SETON                    51
16400    CL1                   MOVELCPY,2    PAGNAM 25
16500    CL1                   EXSR PAGSR                    Packing List
16600    CL1                   SETOF                    51
16700    C*
16800    CL1                   SETON                    52
16900    CL1                   MOVELCPY,3    PAGNAM 25
17000    CL1                   EXSR PAGSR                    File Copy
17100    CL1                   SETOF                    52
17200    CL1                   EXSR BLKDET                   Blank DS
17300    CL1                   ENDIF
17400    C*
17500    CL1                   MOVE BARTOT   BARPRC 150      Load Totals
```

```
17600    CL1                  Z-ADDTOTDUE    TOTD@2  92
17700    CL1                  MOVE NAME      NAME@2 25
17800    CL1                  MOVE STREET    STRE@2 25
17900    CL1                  MOVE CITY      CITY@2 25
18000    CL1                  MOVE STATE     STAT@2  2
18100    CL1                  MOVE ZIP       ZIP@2   9
18200    C*
18300    CL1                  EXSR OFFSR
18400    CL1                  MOVE 'END'     PAGTYP           Last Page
18500    CL1                  MOVELCPY,1     PAGNAM
18600    CL1                  ADD  1         PAGCNT
18700    CL1                  EXSR PAGSR                      Customer Copy
18800    C*
18900    CL1                  SETON                  51
19000    CL1                  MOVELCPY,2     PAGNAM
19100    CL1                  EXSR PAGSR                      Packing List
19200    CL1                  SETOF                  51
19300    C*
19400    CL1                  SETON                  52
19500    CL1                  MOVELCPY,3     PAGNAM
19600    CL1                  EXSR PAGSR                      File Copy
19700    CL1                  SETOF                  52
19800    C*
19900    C* Based on page number and page type, determines what overlay to
20000    C* use
20100    C*
20200    CSR      PAGSR       BEGSR
20300    C        PAGTYP      IFEQ 'OF '
20400    C        PAGCNT      IFEQ 1
20500    C                    MOVE 'INVFST 'OVRLAY  8
20600    C                    WRITEINVTOP
20700    C                    ELSE
20800    C                    WRITEINVTP2
20900    C                    MOVE 'INVMID 'OVRLAY
21000    C                    ENDIF
21100    C                    ENDIF
21200    C*
21300    C        PAGTYP      IFEQ 'END'
21400    C        PAGCNT      IFEQ 1
21500    C                    MOVE 'INVALL 'OVRLAY  8
21600    C                    WRITEINVTOP
21700    C                    ELSE
21800    C                    WRITEINVTP2
21900    C                    MOVE 'INVLST 'OVRLAY
22000    C                    ENDIF
22100    C                    ENDIF
22200    C*
22300    C                    EXSR PRTDET                     Print details
22400    C                    WRITEPAGEOF                     Pg 1 of n Msg
22500    C   30               WRITEOFFER                      Write Offer
22600    C   30               WRITEPAGSEG                     Write Segment
22700    C        PAGTYP      IFEQ 'END'
22800    C                    WRITEINVBOT                     Invoice Totals
22900    C                    ENDIF
23000    C                    WRITEPRTOVL                     Print Overlay
23100    C                    WRITEENDPAG                     End Page
23200    C*
23300    C        PAGNAM      IFEQ CPY,1
23400    C                    MOVE 'INVBAC 'OVRLAY  8         Back Overlay
23500    C                    WRITEPRTOVL
23600    C                    ENDIF
23700    C                    WRITEENDPAG
23800    C*
23900    CSR      ENDP        ENDSR
24000    C*
24100    C* Print invoice detail lines from data structure
24200    C*
```

```
24300     CSR      PRTDET    BEGSR
24400     C                  Z-ADD1        X        20
24500     C        1         DO   48       X
24600     C        X         OCUR DETDS
24700     C        ITEM#     IFGT 0
24800     C                  WRITEDETLIN
24900     C                  ENDIF
25000     C                  END
25100     CSR                ENDSR
25200     C*
25300     C* Blank out data structure
25400     C*
25500     CSR      BLKDET    BEGSR
25600     C        1         DO   48       X
25700     C        X         OCUR DETDS
25800     C                  MOVEL*BLANKS  UOM
25900     C                  MOVEL*BLANKS  ITMDES
26000     C                  Z-ADD0        QTY
26100     C                  Z-ADD0        ITEM#
26200     C                  Z-ADD0        SELPRC
26300     C                  Z-ADD0        EXTPRC
26400     C                  END
26500     CSR                ENDSR
26600     C* Set up Date
26700     CSR      DATESR    BEGSR
26800     C                  Z-ADDUDAY     PAYDA
26900     C        UMONTH    ADD  1        PAYMO
27000     C        PAYMO     IFGT 12
27100     C                  Z-ADD1        PAYMO
27200     C        UYEAR     ADD  1        PAYYR
27300     C                  ELSE
27400     C                  Z-ADDUYEAR    PAYYR
27500     C                  ENDIF
27600     C                  MOVE PAYDAA   PAYDAT 60
27700     C                  Z-ADDPAYDAT   PAYDA@ 60
27800     CSR                ENDSR
27900      *
28000      * Set up Offer at end of invoice
28100      *
28200     CSR      OFFSR     BEGSR
28300     C        SLSSED    IFGE 500
28400     C                  Z-ADD1        IX       20
28500     C                  MOVE 'FLWRNB 'PSEG     8          Seed
28600     C                  SETON                  30
28700     C                  GOTO WRTOFR
28800     C                  ENDIF
28900     C        SLSFRT    IFGE 500
29000     C                  Z-ADD7        IX                  Strawberry
29100     C                  MOVE 'STRWNB 'PSEG
29200     C                  SETON                  30
29300     C                  GOTO WRTOFR
29400     C                  ENDIF
29500     C        SLSSUP    IFGE 500
29600     C                  Z-ADD13       IX
29700     C                  MOVE 'TREENB 'PSEG                Tree
29800     C                  SETON                  30
29900     C                  GOTO WRTOFR
30000     C                  ENDIF
30100     C        SLSCHM    IFGE 500
30200     C                  Z-ADD19       IX
30300     C                  MOVE 'BETLNB 'PSEG                Beetle
30400     C                  SETON                  30
30500     C                  GOTO WRTOFR
30600     C                  ENDIF
30700     C*
30800     C                  GOTO ENDOFR
30900     C*
```

```
31000    C          WRTOFR   TAG
31100    C                   MOVE WDS,IX   OFFR@1 24      Build Offer Text
31200    C                   ADD  1        IX
31300    C                   MOVE WDS,IX   OFFR@2 24
31400    C                   ADD  1        IX
31500    C                   MOVE WDS,IX   OFFR@3 24
31600    C                   ADD  1        IX
31700    C                   MOVE WDS,IX   OFFR@4 24
31800    C                   ADD  1        IX
31900    C                   MOVE WDS,IX   OFFR@5 24
32000    C                   ADD  1        IX
32100    C                   MOVE WDS,IX   OFFR@6 24
32200    CSR        ENDOFR   ENDSR
32300    C*
32400       *
32500 **  WDS    WORDS FOR OFFER
32600 Thank You .....
32700 Because you have ordered
32800 over $500 of seeds this
32900 year, on your next seed
33000 order you will receive
33100 a 10% discount.
33200 Thank You .....
33300 Because you have ordered
33400 over $500 of fruit this
33500 year, on your next fruit
33600 order you will receive
33700 a 10% discount.
33800 Thank You .....
33900 Because you have ordered
34000 over $500 of trees this
34100 year, on your next tree
34200 order you will receive
34300 a 10% discount.
34400 Thank You .....
34500 Because you have ordered
34600 over $500 of stuff this
34700 year, on your next stuff
34800 order you will receive
34900 a 10% discount.
35000
35100 **  CPY    Copy Name
35200 Customer Copy
35300 Packing List
35400 File Copy
                        * * * *  E N D   O F   S O U R C E  * * * *
```

INVNEW2 DDS Source

The DDS source for INVNEW2 is as follows:

```
5722WDS V5R2M0                    SEU SOURCE LISTING              11/11/03 17:47:37        1
SOURCE FILE . . . . . . .  SAMPLER/QDDSSRC
MEMBER  . . . . . . . . .  INVNEW2
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
  100    A*  INVNEW2 - Printer File DDS for Super Sun Seeds Invoice
  200    A*          Example 2 (copies and duplex function added)
  300    A*
  400    A*    Printer File Create or Change Parameters:
  500    A*   - Printer Device Type (DEVTYPE)     *AFPDS
  600    A*   - Overflow Line (OVRFLW)            64
  700    A*   - Print on Both Sides (DUPLEX)      *YES
  800    A*       if running on duplex printer
  900    A*
 1000    A* Page 1 Header
 1100    A*- includes Postnet Zip+4
 1200    A*
 1300    A          R INVTOP                SKIPB(10)
```

```
1400    A            ZIPPN       9S       12 BARCODE(POSTNET)
1500    A                                   SPACEA(2)
1600    A            NAME        25A      12
1700    A            STNAME      25A      48
1800    A                                   SPACEA(1)
1900    A            STREET      25A      12
2000    A            STSTRT      25A      48
2100    A                                   SPACEA(1)
2200    A            CITY        25A      12
2300    A            STCITY      25A      48
2400    A                                   SPACEA(1)
2500    A            STATE        2A      12
2600    A            ZIP          9S      16 EDTWRD('      -    ')
2700    A            STSTE        2A      48
2800    A            STZIP        9S      52 EDTWRD('      -    ')
2900    A                                   SPACEA(3)
3000    A            CUST#        6S 0    14 EDTCDE(Z)
3100    A            INVC#        6S 0    32 EDTCDE(Z)
3200    A                                 49DATE EDTCDE(Y)
3300    A            PAYDAT       6S 0    66EDTCDE(Y)
3400    A                                   SPACEA(2)
3500    A            SHPVIA      10A      14
3600    A                                 34DATE EDTCDE(Y)
3700    A            TERMS       10A      47
3800    A            SLSMAN      16A      64
3900    A                                   SPACEA(4)
4000    A*
4100    A* Page 2 Header
4200    A*
4300    A        R INVTP2                  SKIPB(10)
4400    A            NAME        25A      12
4500    A                                   SPACEA(2)
4600    A            CUST#        6S 0    14 EDTCDE(Z)
4700    A            INVC#        6S 0    32 EDTCDE(Z)
4800    A                                 49DATE EDTCDE(Y)
4900    A            PAYDAT       6S 0    66EDTCDE(Y)
5000    A                                   SPACEA(4)
5100    A*
5200    A* Detail Lines
5300    A*
5400    A        R DETLIN                  SPACEA(1)
5500    A            QTY          4S 0     8 EDTCDE(Z)
5600    A            UOM          2A      13
5700    A            ITEM#        8S 0    18
5800    A            ITMDES      25A      28
5900    A N51        SELPRC       6S 2    58 EDTCDE(J)
6000    A N51        EXTPRC       7S 2    70 EDTCDE(J)
6100    A*
6200    A* Multipage Message
6300    A*
6400    A        R PAGEOF
6500    A            PAGCON       4A         POSITION(10.7 7.3)
6600    A                                   FNTCHRSET(C0H200A0 T1V10037)
6700    A            PAGCNT       2S 0       POSITION(10.7 7.8)
6800    A                                   FNTCHRSET(C0H200A0 T1V10037)
6900    A                                   EDTCDE(Z)
7000    A            PAGNAM      25A         POSITION(10.7 3.8)
7100    A                                   FNTCHRSET(C0H400B0 T1V10037)
7200    A*
7300    A* Invoice Totals
7400    A* - includes Interleaf 2 of 5 barcode
7500    A*
7600    A        R INVBOT                  SKIPB(51)
7700    A N51        TOTDUE       9S 2    67 EDTWRD('  ,    , $0.  -')
7800    A                                   SPACEA(4)
7900    A  51                              67 ' '
8000    A                                   SPACEA(4)
```

```
8100     A              PAYDA@        6S 0     25 EDTCDE(Y)
8200     A N51          TOTD@2        9S 2     67 EDTWRD('  ,    , $0.  -')
8300     A                                        SPACEA(2)
8400     A  51                                  67 ' '
8500     A                                        SPACEA(2)
8600     A              NAME@2       25A        12
8700     A                                        SPACEA(1)
8800     A              STRE@2       25A        12
8900     A              BARPRC       15S 0      52BARCODE(INTERL2OF5 3)
9000     A                                        SPACEA(1)
9100     A              CITY@2       25A        12
9200     A                                        SPACEA(1)
9300     A              STAT@2        2A        12
9400     A              ZIP@2         9A        16
9500     A*
9600     A* Offer Print
9700     A* - Font 92 is Courier Italic 12-pitch
9800     A*
9900     A        R OFFER                        SKIPB(43)
10000    A                                        FONT(92)
10100    A              OFFR@1       24A        36
10200    A                                        SPACEA(1)
10300    A              OFFR@2       24A        36
10400    A                                        SPACEA(1)
10500    A              OFFR@3       24A        36
10600    A                                        SPACEA(1)
10700    A              OFFR@4       24A        36
10800    A                                        SPACEA(1)
10900    A              OFFR@5       24A        36
11000    A                                        SPACEA(1)
11100    A              OFFR@6       24A        36
11200    A                                        SPACEA(1)
11300    A*
11400    A* Images/Page Segments
11500    A* - variable page segment name from program
11600    A*
11700    A        R PAGSEG                       PAGSEG(&PSEG 7.0 2.6)
11800    A              PSEG          8A  P
11900    A*
12000    A*
12100    A* Images/Page Segments
12200    A* - variable overlay name from program
12300    A*
12400    A        R PRTOVL                        OVERLAY(&OVRLAY 0 0)
12500    A              OVRLAY        8A  P
12600    A*
12700    A* Forces page advance
12800    A*
12900    A        R ENDPAG                        ENDPAGE
                      * * * *  E N D  O F  S O U R C E  * * * *
```

INVNEW3 Floating Super Sun Seeds Invoicing

This version of the Super Sun Seeds invoice demonstrates a dynamic or "floating" document. It uses the capabilities of variable or dynamic positioning within DDS. The invoice is not limited by the structure of the electronic overlay, but is tailored by the customer data.

Figure 135 on page 266 shows a sample of the output for INVNEW3.

Figure 135. INVNEW3 Sample Invoice

Although the output looks similar, the approach is very different. Only the very top (invoice heading) and bottom (payment coupon) of the invoice are overlays.

The invoice heading overlay (INVHEAD) for page 1 is shown below.

Figure 136. Invoice Heading Overlay for Page 1

The middle, where the actual invoice data is printed, is built as you go. The invoice grid lines are drawn vertically with each line item. At an invoice or page break, the grid for the invoice data is "closed" with a horizontal line. If this is the end of the invoice, a total box is drawn.

The INVNEW3 program is very similar to INVNEW2, except that it uses variations of the overlays - INVHEAD, INVHEAD2, and INVPAY. It also includes printer file writes as follows:

DTGRID

Extends the vertical lines .167 inches (6 lines per inch) with each detail line

CLOSE

Draws the horizontal line to close the transaction grid

TOTAL

Draws the total box, and prints the totals

INVNEW3 RPG Source

The INVNEW3 RPG source is shown below:

```
5722WDS V5R2M0                    SEU SOURCE LISTING              11/11/03 17:47:37          1
SOURCE FILE . . . . . . .  SAMPLER/QRPGSRC
MEMBER  . . . . . . . . .  INVNEW3
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
  100      * INVNEW3 - Super Sun Seeds Electronic Invoice
  200      *          Example 3 - Floating Invoice
  300      *
  400      *  This is an enhancement to INVNEW1 and INVNEW2 that adds the
  500      *  following function:
  600      *
  700      *     1. Multiple copies of invoice with routing designation -
  800      *        "Customer Copy", "Packing List", "File Copy"
  900      *     2. Overlay specifying terms and conditions to print on back of
 1000      *        customer copy.
 1100      *     3. Packing List copy suppresses price information.
 1200      *     4. The invoice is a floating document.  Only the invoice
 1300      *        header and payment coupon are static overlays.  The
 1400      *        main part of the invoice is built dynamically using
 1500      *        line commands.  Output format DTGRID extends the vertial
 1600      *        lines of the invoice detail area down.  Output format
 1700      *        CLOSE draws the horizontal line to close the grid.  Format
 1800      *        TOTAL draws the "Total Due" box.
 1900      *
 2000      *  This program reads a transaction file (SEEDDETL), retrieves info
 2100      *  from item master (SEEDITEM) and customer master (SEEDCUST), then
 2200      *  prints invoices.
 2300      *
 2400      *  Different electronic overlays are used depending on whether this
 2500      *  is a one page or multi-page invoice, as well as whether there is
 2600      *  room remaining on the invoice to print a customer offer.  The following
 2700      *  overlays are used:
 2800      *
 2900      *    INVHEAD    1-page invoice header
 3000      *    INVHEAD2   Continuation page invoice header
 3100      *    INVPAY     Payment coupon at bottom
 3200      *    INVBAC     Back side Terms and Conditions overlay
 3300      *
 3400      *  Invoice detail lines are processed until either end of customer order
 3500      *  or end of the page (38 detail lines for page 1, 48 detail lines for
 3600      *  the continuation pages) is reached.  At the end of an order,
 3700      *  a check is made to see if there are more than 18 detail lines left
 3800      *  to print.  If there are, that would not leave room in the invoice body
 3900      *  to print the customer offer.  In this case, the page is printed, and a
 4000      *  new final page is built with the offer and the payment coupon.
 4100      *
 4200      *  The offer is a message (and corresponding image, or page segment) based
 4300      *  on item sales in the customer master.  For example, a flower image
 4400      *  would print if seed sales exceeded $500.
 4500      *
 4600      *
 4700      FSEEDDETLIP E           K         DISK
 4800      FSEEDITEMIF E           K         DISK
```

```
4900       FSEEDCUSTIF E           K        DISK
5000       FINVNEW3 O  E                    PRINTER
5100        *
5200       E                WDS     1  40 24            Text for Offer
5300       E                CPY     1   3 25            Text for Copy
5400        *
5500       IINVCDETL    01
5600       I                                       STNAME          32
5700       I                                       CUST# L1
5800       ICUSTDATA    02
5900       IITEMDATA    03
6000        *
6100        * Data structure to store up to 48 detail lines
6200        *
6300       IDETDS      DS                    48
6400       I                              1   40QTY
6500       I                              5    6 UOM
6600       I                              7  140ITEM#
6700       I                             15  39 ITMDES
6800       I                             40  452SELPRC
6900       I                             46  522EXTPRC
7000        *
7100        * Cust# and Total Amount to print in bar code
7200        *
7300       IBARTOT     DS
7400       I                              1   60CUST#
7500       I                              7  152TOTDUE
7600        *
7700       IPAYDAA     DS
7800       I                              1   20PAYMO
7900       I                              3   40PAYDA
8000       I                              5   60PAYYR
8100        *
8200        * First pass only
8300        *
8400       C         *IN90    IFEQ '0'
8500       C                  SETON                        90
8600       C                  EXSR DATESR
8700       C                  EXSR BLKDET
8800       C                  MOVEL'Page'   PAGCON  4
8900       C                  MOVEL'Total'  TOTCON  9
9000       C                  MOVE 'Due'    TOTCON  9
9100       C                  ENDIF
9200        *
9300        * Start of Customer
9400        *
9500       C         *INL1    IFEQ '1'
9600       C         CUST#    ADD  31200    INVC#   60      Invent Invoice#
9700       C                  Z-ADD0        TOTDUE  92      Reset Totals/Ctrs
9800       C                  Z-ADD0        ITMCNT  30
9900       C                  Z-ADD0        PAGCNT  20
10000      C                  MOVEL'   '    PAGTYP  3
10100      C         CUST#    CHAINSEEDCUST          20     Get Cust Master
10200      C     32           MOVEL'   SAME'STNAME
10300      C                  Z-ADDZIP      ZIPPN   90
10400      C                  SETOF                        30
10500      C                  ENDIF
10600       *
10700       * Process invoice detail
10800       *
10900      C         *IN01    CABNE'1'      ENDDET
11000      C                  Z-ADD0        SELPRC
11100      C         ITM1     CHAINSEEDITEM         21
11200      C         *IN21    CABEQ'1'      ENDDET
11300      C*
11400      C                  ADD  1        ITMCNT
11500      C                  Z-ADD0        EXTPRC
```

```
11600    C          QTY1      MULT SELPRC    EXTPRC 72
11700    C                    Z-ADDQTY1      QTY     40
11800    C          EXTPRC    ADD  TOTDUE    TOTDUE
11900    C*
12000    C* Load item detail fields into data structure
12100    C*
12200    C          ITMCNT    OCUR DETDS                  Set up DS
12300    C*
12400    C* Check end of page
12500    C*
12600    C          PAGCNT    IFEQ 0
12700    C          ITMCNT    CABLT39        ENDDET      35 lines on P1
12800    C                    ELSE
12900    C          ITMCNT    CABLT48        ENDDET      48 lines on Pn
13000    C                    ENDIF
13100    C*
13200    C* If end of page, print
13300    C*
13400    C                    MOVEL'OF '     PAGTYP  3
13500    C                    MOVELCPY,1     PAGNAM 25
13600    C                    ADD  1         PAGCNT
13700    C                    EXSR PAGSR                  Print Cust Copy
13800    C*
13900    C                    SETON                    51
14000    C                    MOVELCPY,2     PAGNAM 25
14100    C                    EXSR PAGSR                  Packing List
14200    C                    SETOF                    51
14300    C*
14400    C                    SETON                    52
14500    C                    MOVELCPY,3     PAGNAM 25
14600    C                    EXSR PAGSR                  File Copy
14700    C                    SETOF                    52
14800    C*
14900    C                    Z-ADD0         ITMCNT
15000    C                    MOVE ' '       PAGTYP      Reg or OF Page
15100    C                    EXSR BLKDET
15200    C          ENDDET    TAG
15300    C*
15400    C* End of Customer Invoice
15500    C*
15600    CL1        ITMCNT    IFGT 18                     No Room for PSEG
15700    CL1                  MOVE 'OF '     PAGTYP      OF page
15800    CL1                  MOVELCPY,1     PAGNAM 25
15900    CL1                  ADD  1         PAGCNT
16000    CL1                  EXSR PAGSR                  Customer Copy
16100    C*
16200    CL1                  SETON                    51
16300    CL1                  MOVELCPY,2     PAGNAM 25
16400    CL1                  EXSR PAGSR                  Packing List
16500    CL1                  SETOF                    51
16600    C*
16700    CL1                  SETON                    52
16800    CL1                  MOVELCPY,3     PAGNAM 25
16900    CL1                  EXSR PAGSR                  File Copy
17000    CL1                  SETOF                    52
17100    C*
17200    CL1                  EXSR BLKDET                 Blank DS
17300    CL1                  ENDIF
17400    C*
17500    C* Setup payment coupon fields
17600    C*
17700    CL1                  MOVE BARTOT    BARPRC 150
17800    CL1                  Z-ADDTOTDUE    TOTD@2  92
17900    CL1                  MOVE NAME      NAME@2 25
18000    CL1                  MOVE STREET    STRE@2 25
18100    CL1                  MOVE CITY      CITY@2 25
18200    CL1                  MOVE STATE     STAT@2  2
```

```
18300    CL1                     MOVE ZIP      ZIP@2   9
18400    C*
18500    CL1                     EXSR OFFSR
18600    CL1                     MOVE 'END'    PAGTYP               Last Page
18700    CL1                     MOVELCPY,1    PAGNAM
18800    CL1                     ADD  1        PAGCNT
18900    CL1                     EXSR PAGSR                         Customer Copy
19000    C*
19100    CL1                     SETON                    51
19200    CL1                     MOVELCPY,2    PAGNAM
19300    CL1                     EXSR PAGSR                         Packing List
19400    CL1                     SETOF                    51
19500    C*
19600    CL1                     SETON                    52
19700    CL1                     MOVELCPY,3    PAGNAM
19800    CL1                     EXSR PAGSR                         File Copy
19900    CL1                     SETOF                    52
20000    C*
20100    C* Based on page number and page type, determines what overlay to
20200    C* use
20300    C*
20400    CSR      PAGSR   BEGSR
20500    C        PAGTYP  IFEQ 'OF '
20600    C        PAGCNT  IFEQ 1
20700    C                     MOVE 'INVHEAD 'OVRLAY  8            Full Header
20800    C                     WRITEINVTOP
20900    C                     ELSE
21000    C                     WRITEINVTP2
21100    C                     MOVE 'INVHEAD2'OVRLAY               Abbrev. Header
21200    C                     ENDIF
21300    C                     ENDIF
21400    C*
21500    C        PAGTYP  IFEQ 'END'
21600    C        PAGCNT  IFEQ 1
21700    C                     MOVE 'INVHEAD 'OVRLAY  8            Full Header
21800    C                     WRITEINVTOP
21900    C                     ELSE
22000    C                     WRITEINVTP2
22100    C                     MOVE 'INVHEAD2'OVRLAY               Abbrev. Header
22200    C                     ENDIF
22300    C                     ENDIF
22400    C*
22500    C                     EXSR PRTDET                        Print details
22600    C                     WRITEDTGRID                        Extend grid
22700    C                     ADD  .167     DWN                  .167 inch down
22800    C                     WRITECLOSE                         Close grid
22900    C                     WRITEPAGEOF                        Pg 1 of n Msg
23000    C    30               WRITEOFFER                         Write Offer
23100    C    30               WRITEPAGSEG                        Write Segment
23200    C                     WRITEPRTOVL                        Print Overlay
23300    C*
23400    C        PAGTYP  IFEQ 'END'
23500    C                     WRITEINVBOT                        Invoice Totals
23600    C                     MOVE 'INVPAY  'OVRLAY  8
23700    C                     WRITEPRTOVL                        Print Overlay
23800    C        DWN     ADD  .5       DWN2                 Offset - Total
23900    C        DWN     ADD  .35      DWN3                  Box
24000    C                     WRITETOTAL
24100    C                     ENDIF
24200    C*
24300    C                     WRITEENDPAG                        End Page
24400    C*
24500    C        PAGNAM  IFEQ CPY,1
24600    C                     MOVE 'INVBAC  'OVRLAY  8            Back Overlay
24700    C                     WRITEPRTOVL
24800    C                     ENDIF
24900    C                     WRITEENDPAG
```

```
25000      C*
25100      CSR         ENDP       ENDSR
25200      C*
25300      C* Print invoice detail lines from DS
25400      C*
25500      CSR         PRTDET     BEGSR
25600      C           PAGCNT     IFEQ 1
25700      C                      Z-ADD3.75      DWN     53       Offset for grid
25800      C                      ELSE
25900      C                      Z-ADD2.42      DWN     53       Offset for grid
26000      C                      ENDIF
26100      C*
26200      C                      Z-ADD1         X       20
26300      C           1          DO   48        X
26400      C           X          OCUR DETDS
26500      C           ITEM#      IFGT 0
26600      C                      WRITEDETLIN
26700      C                      WRITEDTGRID
26800      C                      ADD  .167      DWN
26900      C                      ENDIF
27000      C                      END
27100      CSR                    ENDSR
27200      C*
27300      C* Blank out DS
27400      C*
27500      CSR         BLKDET     BEGSR
27600      C           1          DO   48        X
27700      C           X          OCUR DETDS
27800      C                      MOVEL*BLANKS   UOM
27900      C                      MOVEL*BLANKS   ITMDES
28000      C                      Z-ADD0         QTY
28100      C                      Z-ADD0         ITEM#
28200      C                      Z-ADD0         SELPRC
28300      C                      Z-ADD0         EXTPRC
28400      C                      END
28500      CSR                    ENDSR
28600      C* Set up Date
28700      CSR         DATESR     BEGSR
28800      C                      Z-ADDUDAY      PAYDA
28900      C           UMONTH     ADD  1         PAYMO
29000      C           PAYMO      IFGT 12
29100      C                      Z-ADD1         PAYMO
29200      C           UYEAR      ADD  1         PAYYR
29300      C                      ELSE
29400      C                      Z-ADDUYEAR     PAYYR
29500      C                      ENDIF
29600      C                      MOVE PAYDAA    PAYDAT  60
29700      C                      Z-ADDPAYDAT    PAYDA@  60
29800      CSR                    ENDSR
29900       * Set up Offer at end of invoice
30000      CSR         OFFSR      BEGSR
30100      C           SLSSED     IFGE 500
30200      C                      Z-ADD1         IX      20
30300      C                      MOVE 'FLWRNB   'PSEG    8        Seed
30400      C                      SETON                          30
30500      C                      GOTO WRTOFR
30600      C                      ENDIF
30700      C           SLSFRT     IFGE 500
30800      C                      Z-ADD7         IX               Strawberry
30900      C                      MOVE 'STRWNB   'PSEG
31000      C                      SETON                          30
31100      C                      GOTO WRTOFR
31200      C                      ENDIF
31300      C           SLSSUP     IFGE 500
31400      C                      Z-ADD13        IX
31500      C                      MOVE 'TREENB   'PSEG            Tree
31600      C                      SETON                          30
```

```
31700     C                      GOTO WRTOFR
31800     C                      ENDIF
31900     C          SLSCHM      IFGE 500
32000     C                      Z-ADD19         IX
32100     C                      MOVE 'BETLNB 'PSEG              Beetle
32200     C                      SETON                     30
32300     C                      GOTO WRTOFR
32400     C                      ENDIF
32500     C*
32600     C                      GOTO ENDOFR
32700     C*
32800     C          WRTOFR      TAG
32900     C                      MOVE WDS,IX     OFFR@1 24      Build Offer Text
33000     C                      ADD  1          IX
33100     C                      MOVE WDS,IX     OFFR@2 24
33200     C                      ADD  1          IX
33300     C                      MOVE WDS,IX     OFFR@3 24
33400     C                      ADD  1          IX
33500     C                      MOVE WDS,IX     OFFR@4 24
33600     C                      ADD  1          IX
33700     C                      MOVE WDS,IX     OFFR@5 24
33800     C                      ADD  1          IX
33900     C                      MOVE WDS,IX     OFFR@6 24
34000     CSR        ENDOFR      ENDSR
34100     C*
34200       *
34300 **  WDS    WORDS FOR OFFER
34400 Thank You .....
34500 Because you have ordered
34600 over $500 of seeds this
34700 year, on your next seed
34800 order you will receive
34900 a 10% discount.
35000 Thank You .....
35100 Because you have ordered
35200 over $500 of fruit this
35300 year, on your next fruit
35400 order you will receive
35500 a 10% discount.
35600 Thank You .....
35700 Because you have ordered
35800 over $500 of trees this
35900 year, on your next tree
36000 order you will receive
36100 a 10% discount.
36200 Thank You .....
36300 Because you have ordered
36400 over $500 of stuff this
36500 year, on your next stuff
36600 order you will receive
36700 a 10% discount.
36800
36900 **  CPY    Copy Name
37000 Customer Copy
37100 Packing List
37200 File Copy
                       * * * *  E N D   O F   S O U R C E  * * * *
```

INVNEW3 DDS Source

In the INVNEW3 DDS source, several program variables (&DWN, &DWN2, and &DWN3) are used to control spacing down the page for the DTGRID, CLOSE, and TOTAL record formats.

The INVNEW3 DDS printer file source is shown below:

```
5722WDS V5R2M0                    SEU SOURCE LISTING              11/11/03 17:47:37        1
SOURCE FILE . . . . . . .  SAMPLER/QDDSSRC
MEMBER  . . . . . . . . .  INVNEW3
SEQNBR*...+... 1 ...+... 2 ...+... 3 ...+... 4 ...+... 5 ...+... 6 ...+... 7 ...+... 8
  100     A*  INVNEW3 - Printer File DDS for Super Sun Seeds Invoice
  200     A*            Example 3 (floating grid)
  300     A*
  400     A*    Printer File Create or Change Parameters:
  500     A*   - Printer Device Type (DEVTYPE)     *AFPDS
  600     A*   - Overflow Line (OVRFLW)            64
  700     A*   - Print on Both Sides (DUPLEX)      *YES
  800     A*        if running on duplex printer
  900     A*
 1000     A* Page 1 Header
 1100     A*- includes Postnet Zip+4
 1200     A*
 1300     A          R INVTOP                 SKIPB(10)
 1400     A            ZIPPN       9S        12 BARCODE(POSTNET)
 1500     A                                    SPACEA(2)
 1600     A            NAME        25A       12
 1700     A            STNAME      25A       48
 1800     A                                    SPACEA(1)
 1900     A            STREET      25A       12
 2000     A            STSTRT      25A       48
 2100     A                                    SPACEA(1)
 2200     A            CITY        25A       12
 2300     A            STCITY      25A       48
 2400     A                                    SPACEA(1)
 2500     A            STATE       2A        12
 2600     A            ZIP         9S        16 EDTWRD('      -    ')
 2700     A            STSTE       2A        48
 2800     A            STZIP       9S        52 EDTWRD('      -    ')
 2900     A                                    SPACEA(3)
 3000     A            CUST#       6S 0      14 EDTCDE(Z)
 3100     A            INVC#       6S 0      32 EDTCDE(Z)
 3200     A                                  49DATE EDTCDE(Y)
 3300     A            PAYDAT      6S 0      66EDTCDE(Y)
 3400     A                                    SPACEA(2)
 3500     A            SHPVIA      10A       14
 3600     A                                  34DATE EDTCDE(Y)
 3700     A            TERMS       10A       47
 3800     A            SLSMAN      16A       64
 3900     A                                    SPACEA(4)
 4000     A*
 4100     A* Page 2 Header
 4200     A*
 4300     A          R INVTP2                 SKIPB(10)
 4400     A            NAME        25A       12
 4500     A                                    SPACEA(2)
 4600     A            CUST#       6S 0      14 EDTCDE(Z)
 4700     A            INVC#       6S 0      32 EDTCDE(Z)
 4800     A                                  49DATE EDTCDE(Y)
 4900     A            PAYDAT      6S 0      66EDTCDE(Y)
 5000     A                                    SPACEA(4)
 5100     A*
 5200     A* Detail Lines
 5300     A*
 5400     A          R DETLIN                 SPACEA(1)
 5500     A            QTY         4S 0       8 EDTCDE(Z)
 5600     A            UOM         2A        13
 5700     A            ITEM#       8S 0      18
 5800     A            ITMDES      25A       28
 5900     A N51        SELPRC      6S 2      58 EDTCDE(J)
 6000     A N51        EXTPRC      7S 2      70 EDTCDE(J)
 6100     A*
 6200     A* Floating Grid
 6300     A*
```

```
 6400      A            R DTGRID
 6500      A                                        LINE(&DWN .55 0.167  *VRT *NARROW)
 6600      A                                        LINE(&DWN 1.15 0.167 *VRT *NARROW)
 6700      A                                        LINE(&DWN 1.55 0.167 *VRT *NARROW)
 6800      A                                        LINE(&DWN 2.55 0.167 *VRT *NARROW)
 6900      A                                        LINE(&DWN 5.65 0.167 *VRT *NARROW)
 7000      A                                        LINE(&DWN 6.55 0.167 *VRT *NARROW)
 7100      A                                        LINE(&DWN 7.94 0.167 *VRT *NARROW)
 7200      A            DWN          5S 3P
 7300      A*
 7400      A* Close Grid
 7500      A*
 7600      A            R CLOSE
 7700      A                                        LINE(&DWN .55 7.40 *HRZ *NARROW)
 7800      A            DWN          5S 3P
 7900      A*
 8000      A* Total Box
 8100      A*
 8200      A            R TOTAL
 8300      A                                        LINE(&DWN 6.55 0.5 *VRT *NARROW  )
 8400      A                                        LINE(&DWN 7.93 0.5 *VRT *NARROW  )
 8500      A                                        LINE(&DWN2 6.55 1.4 *HRZ *NARROW )
 8600      A            TOTCON       9A             POSITION(&DWN3 5.1)
 8700      A                                        FNTCHRSET(C0H200A0 T1V10037)
 8800      A N51        TOTDUE       9S 2           EDTWRD('  ,    , $0.  -')
 8900      A                                        POSITION(&DWN3 6.5)
 9000      A            DWN          5S 3P
 9100      A            DWN2         5S 3P
 9200      A            DWN3         5S 3P
 9300      A*
 9400      A* Multipage Message
 9500      A*
 9600      A            R PAGEOF
 9700      A            PAGCON       4A             POSITION(10.7 7.3)
 9800      A                                        FNTCHRSET(C0H200A0 T1V10037)
 9900      A            PAGCNT       2S 0           POSITION(10.7 7.8)
10000      A                                        FNTCHRSET(C0H200A0 T1V10037)
10100      A                                        EDTCDE(Z)
10200      A            PAGNAM       25A            POSITION(10.7 3.8)
10300      A                                        FNTCHRSET(C0H400B0 T1V10037)
10400      A*
10500      A* Invoice Totals
10600      A* - includes Interleaf 2 of 5 barcode
10700      A*
10800      A            R INVBOT                    SKIPB(55)
10900      A            PAYDA@       6S 0       25 EDTCDE(Y)
11000      A N51        TOTD@2       9S 2       67 EDTWRD('  ,    , $0.  -')
11100      A                                        SPACEA(2)
11200      A   51                                67 ' '
11300      A                                        SPACEA(2)
11400      A            NAME@2       25A        12
11500      A                                        SPACEA(1)
11600      A            STRE@2       25A        12
11700      A            BARPRC       15S 0      52BARCODE(INTERL2OF5 3)
11800      A                                        SPACEA(1)
11900      A            CITY@2       25A        12
12000      A                                        SPACEA(1)
12100      A            STAT@2        2A        12
12200      A            ZIP@2         9A        16
12300      A*
12400      A* Offer Print
12500      A* - Font 92 is Courier Italic 12-pitch
12600      A*
12700      A            R OFFER                     SKIPB(43)
12800      A                                        FONT(92)
12900      A            OFFR@1       24A        36
13000      A                                        SPACEA(1)
```

```
13100   A               OFFR@2        24A       36
13200   A                                       SPACEA(1)
13300   A               OFFR@3        24A       36
13400   A                                       SPACEA(1)
13500   A               OFFR@4        24A       36
13600   A                                       SPACEA(1)
13700   A               OFFR@5        24A       36
13800   A                                       SPACEA(1)
13900   A               OFFR@6        24A       36
14000   A                                       SPACEA(1)
14100   A*
14200   A* Images/Page Segments
14300   A* - variable page segment name from program
14400   A*
14500   A        R PAGSEG                       PAGSEG(&PSEG 7.0 2.6)
14600   A          PSEG          8A  P
14700   A*
14800   A*
14900   A* Images/Page Segments
15000   A* - variable overlay name from program
15100   A*
15200   A        R PRTOVL                       OVERLAY(&OVRLAY 0 0)
15300   A          OVRLAY        8A  P
15400   A*
15500   A        R ENDPAG                       ENDPAGE
                 * * * *  E N D   O F   S O U R C E   * * * *
```

Appendix C. Performing Advanced Font Tasks with iSeries Navigator

There are several tasks you can perform on fonts with iSeries Navigator that require advanced knowledge of fonts. Changing values for the font mapping tables and specifying font capture should only be done by a qualified system administrator. You can perform these advanced tasks with the AFP Manager component of iSeries Navigator. For information about installing AFP Manager, see "Installing AFP Manager" on page 228.

- "Viewing and Changing Font Mapping Tables"
- "Creating a Font Mapping Table" on page 278
- "Activating Font Capture" on page 279

Viewing and Changing Font Mapping Tables

You can view system font mapping tables or view and change user-defined font mapping tables with AFP Manager by following these steps:

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to an i5/OS.
4. Expand **AFP Manager** then **Font Mapping Tables**.
5. To view the system tables, open **System Tables**. To view a user-defined table, open **User Tables**.
6. Double-click the table you want to view. Figure 137 shows the user-defined HPFCS table.
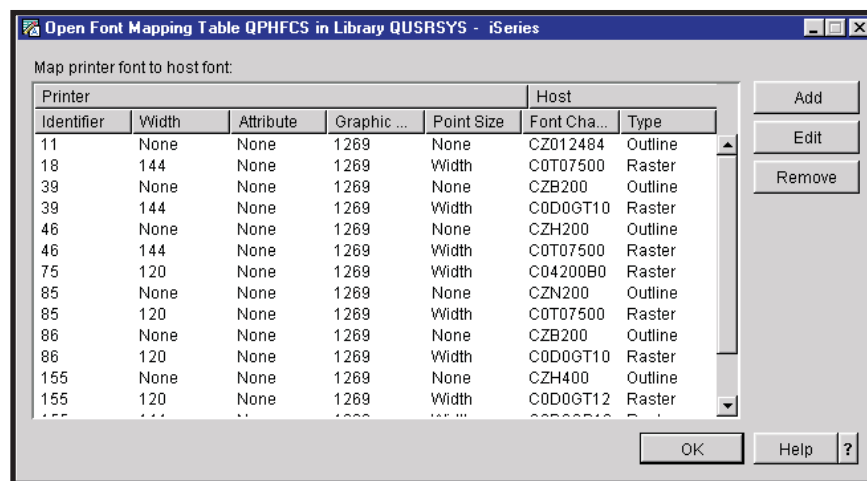
Figure 137. Open Font Mapping Table Window

7. (Optional) To add an entry to a user-defined table, click **Add**. This opens a new window. Fill in the appropriate values and click **OK**.
8. (Optional) To edit an entry in a user-defined table, select the entry and click **Edit**. This opens a new window. Fill in the new values for the font to map to and click **OK**.

9. (Optional) To remove an entry from a user-defined table, select the entry and click **Remove**.

10. For help press F1 or click **Help**.

11. Click **OK**.

Creating a Font Mapping Table

You can create user-defined font mapping tables with AFP Manager by following the steps below. You can only create one font mapping table of each kind (except printer-to-printer font). The table is named by the system *PHFCS, *HPFCS, *PHCP, *HPCP as appropriate, and stored in QUSRSYS. You can name printer resident font to printer resident font mapping tables and specify the library to store them in.

1. Double-click the iSeries Access icon.

2. Double-click the iSeries Navigator icon.

3. Open a connection to an i5/OS.

4. Expand **AFP Manager** then **Font Mapping Tables**.

5. Right-click **User Tables** and select **New...**. The window shown in Figure 138 opens.
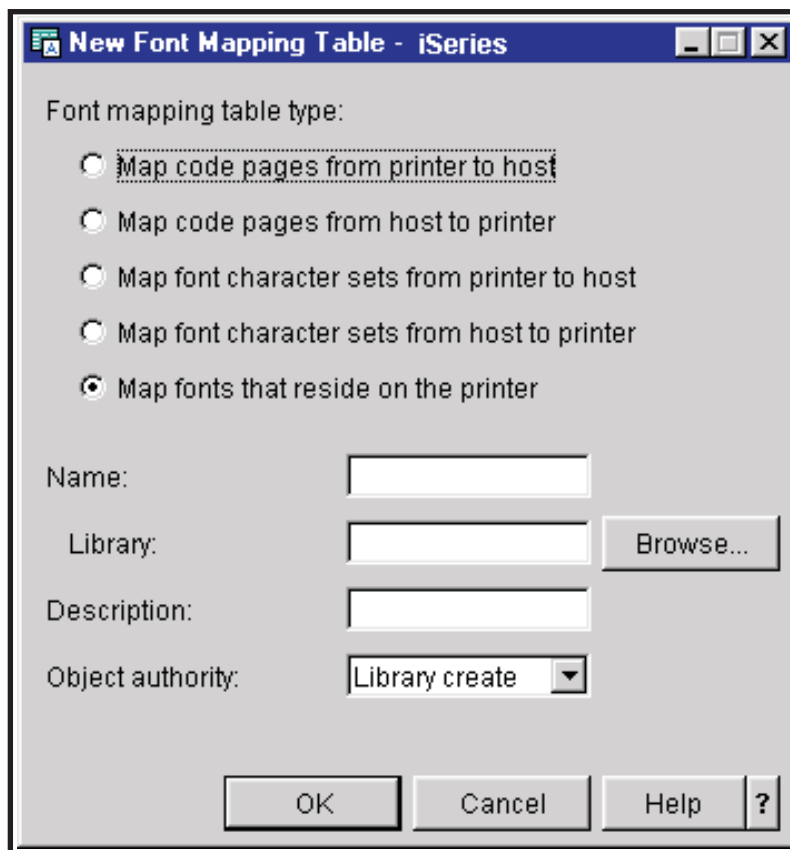
Figure 138. New Font Mapping Table Window

6. Specify the type of font mapping table to create. If you want to map printer fonts to printer fonts, give it a name and specify what library to put it in. You cannot specify the name or library for any other kind of font mapping table because you can only create one of each type. For help press F1 or click **Help**.

7. Click **OK**.
8. To add entries to the table, follow steps 5 through 7 in "Viewing and Changing Font Mapping Tables" on page 277.

Activating Font Capture

To use AFP Manager to activate font capture, follow these steps:

1. Mark the font as eligible for capture by following these steps. You can only mark a font that you are importing to your i5/OS as eligible for capture.

   a. Follow steps 1 through 4 in "Importing Resources to the i5/OS" on page 234.

   b. Right-click **Code pages** or **Font character sets**, and select **Import**. A window like the one shown in Figure 139 opens, depending on the type of resource you selected.
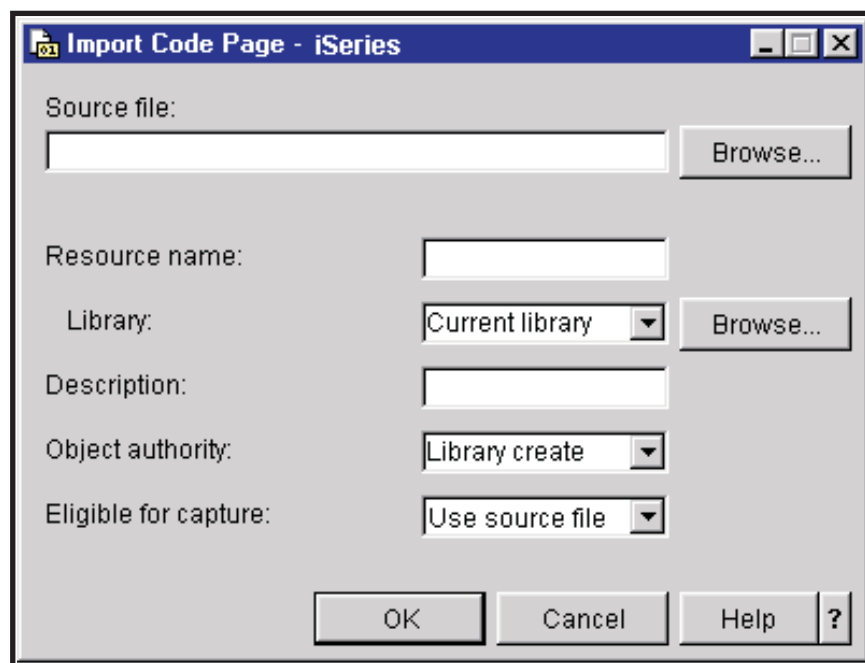
Figure 139. Import Code Page Window

   c. Fill in the fields as appropriate. By **Eligible for capture**, select **Yes**. For help press F1 or click **Help**.

   d. Click **OK**.

2. Activate font capturing for eligible fonts by following these steps.

   Note: These instructions are for changing an existing PSF configuration object. To create a PSF configuration object, follow the steps in "Creating a PSF Configuration Object" on page 232.

   a. Double-click the iSeries Access icon.

   b. Double-click the iSeries Navigator icon.

   c. Open a connection to an i5/OS.

   d. Expand **AFP Manager** then **PSF Configurations**.

e. Right-click the PSF configuration object you want to change and select **Configure**.

f. On the **Resources** page, make sure that **Save downloaded fonts on printer** is selected as shown in Figure 140. For help, press F1 or click **Help**.
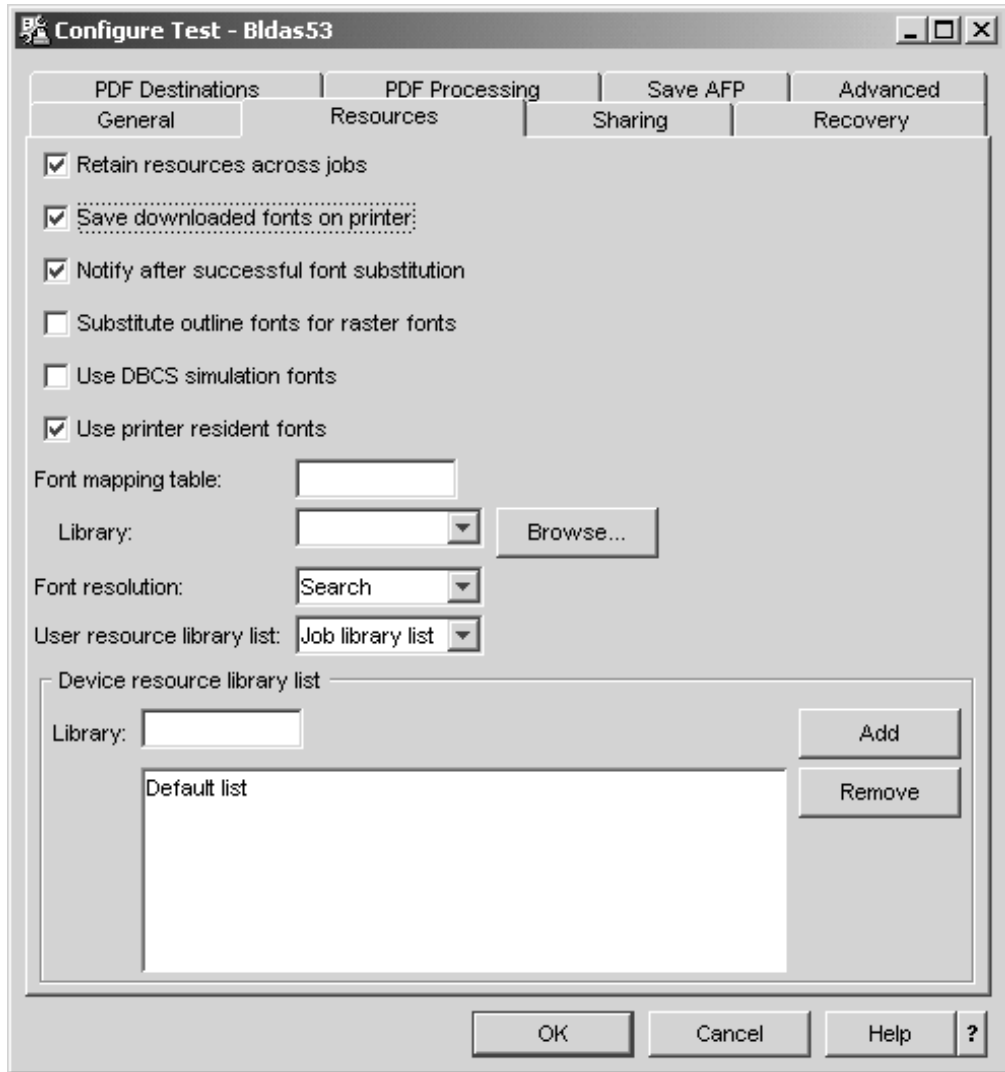
Figure 140. Enabling Font Capture

g. Click **OK**.

Appendix D. Finding i5/OS Objects in the Integrated File System

This appendix introduces the integrated file system and discusses how find your stored i5/OS objects. "How PSF Searches for Resources" on page 285 describes how PSF searches for the resources you request in your documents.

Introducing the Integrated File System

The integrated file system is a part of i5/OS that supports stream input and output, and storage management similar to PC and UNIX® operating systems, while providing a structure over all information stored in your server. The integrated file system:

- Has support for storing information in stream files that can contain long continuous strings of data. These strings of data might be the text of a document or the picture elements in a picture. The stream file support is designed for efficient use in client/server applications.
- Has a hierarchical directory structure that lets you organize objects like fruit on the branches of a tree. You specify the path through the directories to accesses an object.
- Has a common interface that lets users and applications access these when they are stored in your server:

Stream files	Documents	Libraries	Objects
Database files	Resources	Folders	

- Provides a common view of stream files that are stored in these locations:

locally on your server	a Network File System server
an integrated xSeries™ server	a remote iSeries server
a Novell NetWare server	remotely on a Local Area Network (LAN) server
a remote Windows NT server	

A file system helps you access specific segments of storage that are organized as logical units. The logical units on a server are libraries, directories, files, and objects.

The integrated file system contains these file systems. Unless otherwise noted, they are stream-file based:

Network File System (NFS)
> Lets you access a remote NFS server.

Document Library Services (QDLS)
> Contains documents and folders.

QFileSvr.400
> Lets you access other file systems on remote iSeries servers.

Netware File System (QNetWare)
> Lets you access local and remote data on Novell.

Windows NT (QNTC)
> Lets you access data and objects stored on Windows NT servers.

QOpenSys
> Lets you access UNIX-based information in formats such as POSIX and XPG. This file system is case sensitive.

Optical file System (QOPT)
> Lets you access stream data stored on optical media.

Library File System (QSYS.LIB)
> Contains iSeries database files and other objects, with objects limited to 16 MB. This is a record-based file system. However, when you access it through the integrated file system, the database file members in this file system look like stream files to your application.

"root" (/) File System ("root")
> Gives DOS and OS/2® stream file support.

User-Defined File System (UDFS)
> File system that you create and manage.

Finding an Object in the Integrated File System

You use paths to store and locate objects in the integrated file system. There are two basic ways to specify paths:

- **Absolute (Full) Path Name**: An absolute path name starts at the highest ("root") level. For example, `/Dept2/Photos/Smith`.
- **Relative Path Name**: A relative path name begins at the current directory. For example, if you are in the `Dept2` directory, you can get to the same place specified with the absolute path name above by specifying `Photos/Smith`.

File systems can define how deep a path can go. For example, these common i5/OS file systems have the given levels of hierarchy:

QSYS.LIB
> Lets you specify a maximum of three levels of directory hierarchy. For example, `QSYSLIB/MyLib.LIB/MyFile.FILE/MyMember.MBR`

/ ("root")
> Has no maximum number of levels of directory hierarchy. For example, you could specify `DIR1/DIR2/DIR3/...DIRn/object`.

QDLS Lets you specify a maximum of 32 levels of directory hierarchy.

All file systems have unique characteristics. For more information about the file systems in the integrated file system, refer to the *File Systems and Management* topic in the iSeries Information Center.

Moving Data between File Systems

There are several different ways you can move data between file systems, depending on your needs. These are some different tools you can use:

iSeries Navigator
> iSeries Navigator is a graphical user interface that lets you work with your iSeries system from your workstation. To work with iSeries files and objects with iSeries Navigator, follow these steps:
>
> 1. Double-click the iSeries Access icon.

2. Double-click the iSeries Navigator icon.
3. Open a connection to an i5/OS.
4. Expand **File Systems** to display a list of all i5/OS file systems to which you are authorized, as shown in Figure 141.
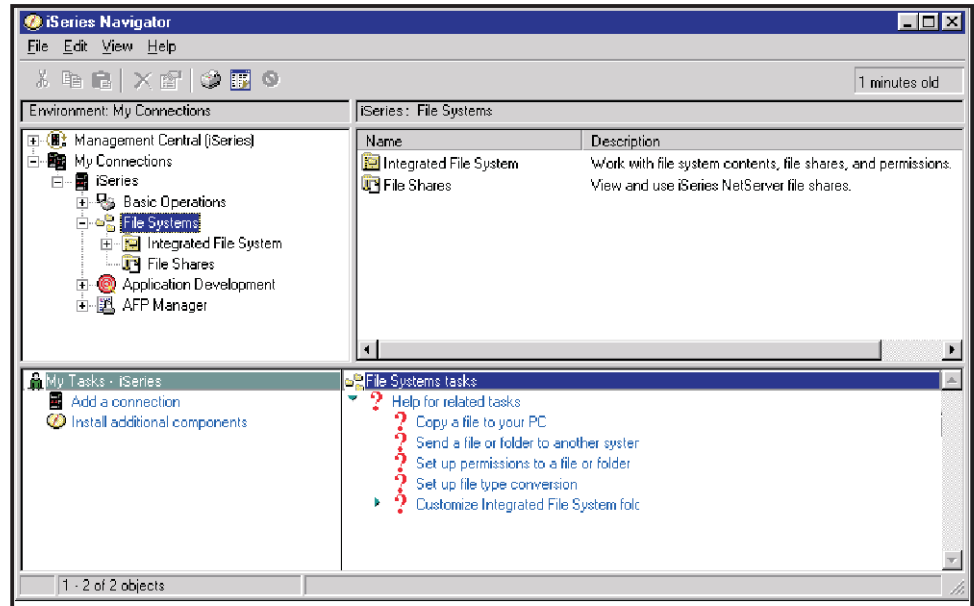
Figure 141. iSeries Navigator File Systems

5. You can access i5/OS objects by expanding through the directories to the object. When you reach the object you want to work with, right-click for a list of options.

   You can also drag and drop files within and between iSeries servers and the PC desktop and send files and folders to multiple systems using Management Central.

6. For help press F1 or click **Help**.

i5/OS Command Line

i5/OS has a set of CL commands for working with files in the integrated file system. To view all of the available commands, enter Go DATA on the command line then select 5 "Integrated File System". This screen appears:

```
 FILESYS                      Integrated File System
                                                      System:    ISERIES
 Select one of the following:

      1. Directory commands
      2. Object commands
      3. Security commands




 Selection or command
 ===>

 F3=Exit    F4=Prompt    F9=Retrieve    F12=Cancel    F13=Information Assistant
 F16=AS/400 Main menu
 (C) COPYRIGHT IBM CORP. 1980, 2002.
```

From this screen you can browse the available commands. For example, if you enter 2 "Object commands", you are given this list of object commands:

```
FSOBJ                        Object Commands
                                                    System:    ISERIES
 Select one of the following:

      1. Work with object links
      2. Display object links
      3. Copy object
      4. Rename object
      5. Move object
      6. Add link
      7. Remove link
      8. Check out object
      9. Check in object
     10. Copy to stream file
     11. Copy from stream file
     12. Save object
     13. Restore object
                                                               More...
 Selection or command
 ===>


 F3=Exit    F4=Prompt    F9=Retrieve    F12=Cancel    F13=Information Assistant
 F16=AS/400 Main menu
```

Choosing any of the commands from this screen brings up the window for that command. For example, selecting 3 "Copy object" brings up this window:

```
                          Copy Object (CPY)

 Type choices, press Enter.

 Object . . . . . . . . . . . . .

 To directory . . . . . . . . . .     '.'

 To object  . . . . . . . . . . .

 Symbolic link  . . . . . . . . .     *NO          *NO, *YES
 From CCSID . . . . . . . . . . .     *OBJ         1-65533, *OBJ, *PCASCII...
 To CCSID . . . . . . . . . . . .     *OBJ         1-65533, *OBJ, *CALC...
 Data Format  . . . . . . . . . .     *BINARY      *BINARY, *TEXT
 Directory subtree  . . . . . . .     *NODIR       *NODIR, *NONE, *ALL
 Replace object . . . . . . . . .     *NO          *NO, *YES
 Owner  . . . . . . . . . . . . .     *NEW         *NEW, *KEEP



                                                               Bottom
 F3=Exit    F4=Prompt    F5=Refresh    F12=Cancel    F13=How to use this display
 F24=More keys
```

File Transfer Protocol (FTP)

The default file format for FTP is the traditional iSeries library system (QSYS.LIB). To FTP to and from the integrated file system, issue the command QUOTE SITE NAMEFMT 1 at the FTP command prompt. This changes the FTP protocol defaults to operate within the integrated file system.

If you choose not to change the FTP file format and use FTP within traditional iSeries library system, or if you change the file format but try to FTP within QSYS.LIB, you cannot use it to directly transfer objects such as

programs and AFP resources. To use FTP to transfer non-supported objects, save the object in a save file (SAVF) and transfer the save file.

Windows Mapped Drive

If your PC is connected to an iSeries server, you can interact with the directories and objects of the integrated file system as if they were stored on the your PC. You can copy objects between directories by using the drag-and-drop capability of Windows Explorer. You can also copy an object from your iSeries server to the PC by selecting the object in the mapped server drive and dragging the object to the PC directory.

How PSF Searches for Resources

i5/OS resources, such as fonts and overlays, are stored in libraries. It is important that PSF be able to find the correct resources. This section describes how PSF searches for resources and how you can affect which libraries are searched.

PSF searches libraries specified in library lists and the system font libraries for resources. You can accept the default library list or specify a user resource library list and device resource library list.

Note: PSF does not use library lists to search for object containers or TrueType fonts. For information about how PSF searches for object containers, see "How PSF Searches for Object Containers" on page 286. For information about how PSF selects a TrueType font, see "How PSF Finds a TrueType Font" on page 84.

To make a resource library available to all users at all times, you have two options. You must stop and re-start PSF for these changes to take affect:

- Specify the library in a specific library list
- Rename the library QFNTnn, where *nn* is in the range 01 through 19.

When a resource is named without a library qualifier, PSF looks in these libraries in the order listed:

1. The job (interactive or batch) library list
2. System font libraries, as listed below:
    - QFNTCPL
    - QFNT01-QFNT19
    - QFNT61-QFNT69

You can override the system library list and specify a library list for a particular printer (device resource library list) or a user resource library list with a PSF configuration object. If you specify both a user library list and a device library list, PSF searches the lists in this order when looking for a resource:

1. User resource library list
2. Device resource library list

There is a two-fold value in using the user resource library and device resource library lists. They enhance usability because, for example, it lets you specify one set of libraries for a 240-pel printer and another set of libraries for a 300-pel printer (with the device resource library list). You also can ensure that the libraries that contain the resources needed by the specified job are in the library list that PSF will use. Using the library lists also can improve performance because you can have PSF search only the necessary libraries.

Figure 142 illustrates how PSF searches for resources.

User Resource Library List
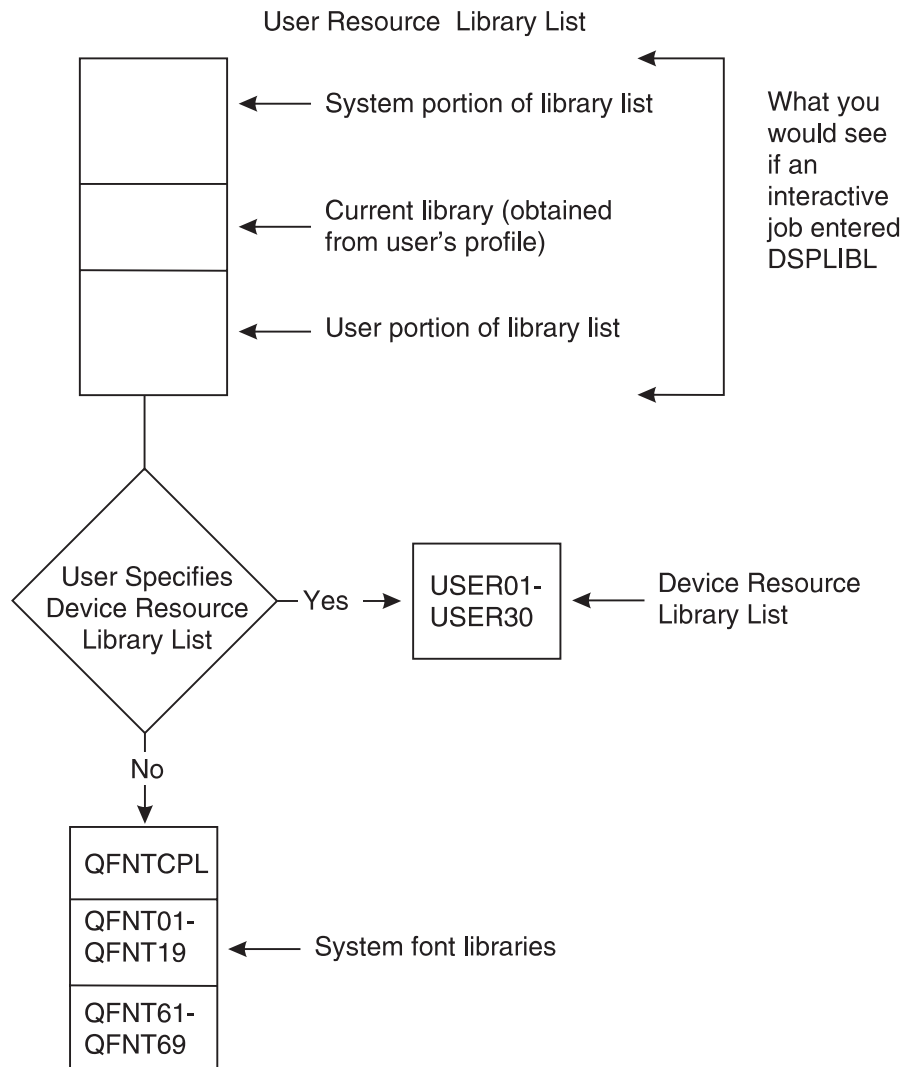
Figure 142. How PSF Searches for Resources

How PSF Searches for Object Containers

This is how PSF searches for object containers. Notice that it does not use library lists:

1. PSF first determines whether the object is inline. If so, the inline resource is used and no further searching is done.
2. If the DDS AFPRSC keyword specifies a path, that path is searched for the resource.
3. The path specified with the system-level value for environment variable QIBM_AFP_RESOURCES_PATH is searched.
4. If the resource is not found, and the spooled file resides on an independent disk pool, the /<independent-disk-pool-name>/QIBM/UserData/OS400/AFPresources directory, if it exists, is searched. You are responsible for creating directory /QIBM/UserData/OS400/AFPresources on an independent disk pool. Subdirectories are not searched.

5. If the resource is not found, or the spooled file resides on *SYSBAS, the /QIBM/UserData/OS400/AFPresources directory on the system ASP is searched. Subdirectories are not searched.

Specifying Resource Library Lists

You specify both user and device resource library lists on a PSF configuration object.

Specify a user resource library list in a PSF configuration object on the User resource library list (USRRSCLIBL) parameter. To use a device resource library list, specify it on the Device resource library list (DEVRSCLIBL) parameter. This is the screen that opens when you enter CRTPSFCFG on the i5/OS command line:

```
                    Create PSF Configuration (CRTPSFCFG)

 Type choices, press Enter.

 PSF configuration  . . . . . . .                 Name
   Library  . . . . . . . . . . .     *CURLIB     Name, *CURLIB
 User resource library list . . .   *JOBLIBL      *JOBLIBL, *CURLIB, *NONE
 Device resource library list . .   *DFT          Name, *DFT
               + for more values
 IPDS pass through  . . . . . . .   *NO           *NO, *YES
 Activate release timer . . . . .   *NORDYF       *NORDYF, *IMMED...
 Release timer  . . . . . . . . .   *NOMAX        1-1440, *NOMAX, *SEC15...
 Restart timer  . . . . . . . . .   *IMMED        1-1440, *IMMED
 APPC and TCP/IP retry count  . .   15            1-99, *NOMAX
 Delay between APPC retries . . .   90            0-999
 Acknowledgment frequency . . . .   100           1-32767
 Printer response timer . . . . .   *NOMAX        5-3600, *NOMAX
 Generate PDF output  . . . . . .   *NONE         *NONE, *SPLF, *STMF, *MAIL


                                                                    Bottom
 F3=Exit    F4=Prompt   F5=Refresh   F10=Additional parameters   F12=Cancel
 F13=How to use this display        F24=More keys
```

Example:

To change the PSF configuration object MY_CONFIG so that current library for the job that created the spooled file is used to search for AFP resources first (the user resource library list), then libraries LIB1 and LIB2 are searched (the device resource library list), enter this command:

CHGPSFCFG PSFCFG(MY_CONFIG) USRRSCLIBL(*CURLIB) DEVRSCLIBL(LIB1 LIB2)

Using AFP Manager to Specify Resource Library Lists

You can use AFP Manager to create or change a PSF configuration object, including specifying resource library lists. AFP Manager is part of iSeries Navigator.

Follow these steps to specify a user resource library list and a device resource library list on an existing PSF configuration object using AFP Manager. You can also use AFP Manager to create a new PSF configuration object. For steps see "Creating a PSF Configuration Object" on page 232.

1. Double-click the iSeries Access icon.
2. Double-click the iSeries Navigator icon.
3. Open a connection to a 5.1 or higher server.
4. Expand **AFP Manager** then **PSF Configurations**.

5. From the list of PSF configuration objects, right-click the one you want to modify and select **Configure...**.
6. On the Resources page, select a value for **User resource library list**.
7. The default device resource library list is automatically specified. To specify different libraries, put the library name in the empty field and click **Add**. Add up to 30 libraries, one at a time.
8. For help press F1 or click **Help**.
9. Click **OK**.

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Glossary

This glossary defines technical terms and abbreviations that are used in this document. If you do not find the term you are looking for, refer to the index of this publication or view *IBM Dictionary of Computing*, located at:

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.

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These cross-references are used in this glossary:

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

A

ACIF. AFP Conversion and Indexing Facility.

addressable point. Any point in a presentation surface that can be identified by a coordinate from the coordinate system of the presentation medium. See also pel.

Advanced Function Common Control Unit. A high-speed print controller. It can quickly resolve AFP data streams and resources into completed pages.

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

Advanced Function Presentation Application Programming Interface. An AFP program shipped with PSF/MVS 2.1.1 and later and PSF/VM 2.1.1 that creates the AFP data stream from the COBOL and PL/1 high-level programming languages.

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

Advanced Function Presentation Utilities for iSeries (AFP Utilities). An IBM licensed program that includes a group of utilities that work together to provide Advanced Function Presentation on the iSeries.

AFCCU. Advanced Function Common Control Unit.

AFP. Advanced Function Presentation.

AFP API. Advanced Function Presentation Application Programming Interface.

AFP Conversion and Indexing Facility. An AFP program you can use to convert a print file into a MO:DCA-P document, to retrieve resources used by the document, and to index the file for later retrieval and viewing.

AFPDS. AFP data stream; a synonym for the composed page, MO:DCA-P based data stream interchanged in AFP environments.

AFP Manager. A component of iSeries Navigator. AFP Manager lets you work with these objects associated with AFP output: PSF configuration objects, font mapping tables, and resources. iSeries Navigator is a feature of iSeries Access.

AFP Utilities for iSeries (AFP Utilities). Advanced Function Presentation Utilities for iSeries

AFP Workbench for Windows. A platform for the integration of AFP enabling applications and services. The AFP Viewer application is a Workbench tool.

all points addressable (APA). The capability to address, reference, and position text, overlays, and images at any defined point (pel) on the printable area of the paper. See *page mode*.

American National Standard Code for Information Interchange. A standard code, using a coded character set consisting of 7-bit coded characters (8-bits, including the parity check), that is used for information interchange among data processing systems, data communication systems, and their associated equipment. The ASCII set consists of control characters and graphic characters.

APA. All points addressable

APA printers. Devices that are all points addressable; in other words, devices that print with picture elements on the printing medium at any valid location on a sheet of paper.

APPC. Advanced program-to-program communication. APPC is the implementation of the SNA LU session type 6.2 architecture.

application program. A program written for or by a user that applies to the user's work, such as a program that does inventory control or payroll.

application programmer. A programmer who is responsible for writing programs for specific applications. The application programmer takes application data and writes programs to print it on line and AFP printers.

Application System/400®. The former name of the hardware on which i5/OS runs.

APU Monitor. A program that, when processed, applies print definitions to selected spooled files so that the spooled files are automatically converted to AFP print files.

architecture. The set of rules and conventions that govern the creation and control of data types such as text, image, graphics, font, fax, color, audio, bar code, and multimedia.

ASCII. American National Standard Code for Information Interchange

AS/400. Application System/400

B

bar code. A code representing characters by sets of parallel bars of varying thickness and separation that are read optically by transverse scanning. (I)

baseline. In a font, the imaginary line on which successive characters are aligned in the inline direction.

batch. (1) A group of records or data processing jobs brought together for processing or transmission. (2) Pertaining to activity involving little or no user action. Contrast with interactive.

batch environment. The environment in which non-interactive programs are executed. The environment schedules their execution independently of their submitter. Contrast with interactive environment.

burst. To separate continuous-form paper into separate sheets.

C

ccsid. Coded character set identifier.

character. (1) A symbol used in printing. For example, a letter of the alphabet, a numeral, a punctuation mark or any other symbol that represents information. (2) A byte of data.

character graphic. The visual representation of a character, defined by toned or untoned picture elements (pels). **Note:** An untoned pel (a reverse character) is visually represented by the toned pels around it.

character increment. The distance the current print position is increased by printing the current character graphic.

character rotation. The alignment of a character relative to the baseline, measured in degrees in a clockwise direction. Examples are 0°, 90°, 180°, and 270°.

characters per inch. A unit of measurement for the width of a printed character, reflecting the number of times a graphic character can be set in 1 inch. For example a 10-characters per inch (CPI) font can print 10 characters in one inch. Uniformly spaced fonts are measured in characters per inch.

character set. A collection of characters that is composed of some descriptive information and the character shapes themselves. Synonymous with *font character set*.

code page. A font component that associates code points and character identifiers. A code page also identifies how undefined code points are handled.

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

coded font. A font library member that associates a code page with a font character set. For double-byte

fonts, a coded font associates more than one pair of code pages and font character sets.

command. A request from a terminal or a specification in a batch processing job for the performance of an operation or the execution of a particular program.

composition. The act or result of formatting a document.

conditional processing. A page definition function that enables input data records to partially control their own formatting.

constant data. (1) Data with a value that does not change. (2) Data that has an unchanging, predefined value to be used in processing. A constant does not change during execution of a program, but the contents of a field or variable can. Contrast with variable data.

continuous-forms paper. A series of connected forms that feed continuously through a printer. The connection between the sheets is perforated to enable the user to tear them apart. Before printing, the sheets are folded in a stacked arrangement, with the folds along the perforations. (Note that some continuous forms are in rolls and are not folded.) Contrast with cut-sheet paper.

copy. The specification level of an APU print definition where most layout work, such as specifying page layout options, selecting and placing images, and defining constants and boxes, is done.

cpi. characters per inch

cut-sheet emulation. Printing sheets side-by-side on either a simplex or duplex continuous forms printer that supports cut-sheet emulation. The output, when slit and collated by post-processing equipment, looks like output generated by a cut-sheet printer.

cut-sheet paper. Paper that is cut into separate sheets before being printed on. Contrast with *continuous-forms paper*.

D

Data Description Specifications (DDS). Provides a set of i5/OS keywords that let format output external to the application program. For example, you can draw shapes, specify fonts, include overlays, and specify formatting with DDS keywords.

data object resource. Object containers or IOCA images that are sent to the printer in the IPDS home state. Object containers or IOCA images sent to the printer in this state are saved as data object resources to be used later while processing a page or overlay.

data processing. The systematic performance of operations upon data; for example, handling, merging, sorting, and computing. (I) (A)

data set. Synonym for *file*.

data stream. (1) All data transmitted through a data channel 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. (3) Records sent to PSF from the print files and the resource libraries.

database. A set of data, part or the whole of another set of data that consists of at least one file, and that is sufficient for a given purpose or for a given data-processing system. (I) (A)

database file. A record arranged file; It has predefined subdivisions consisting of one or more fields that have specific characteristics, such as length and data type. Also called "record-based file" Commonly used when fields need to be individually accessed and manipulated. The i5/OS object type is *FILE. Contrast with *stream file*.

DBCS. See *double-byte character set*.

DDS. See *Data Description Specifications*.

direction. The print position of data on a logical page, line, or field. The ultimate reference point for all direction controls on a page is the hardware origin. Secondary and tertiary reference points are possible as well, enabling more than one print direction on a page.

ditroff. A file format consisting of device-independent data produced by the troff utility. See troff.

document. (1) A publication or other written material pertaining to a specific subject or related subjects. (2) In word processing, a collection of one or more lines of text that can be named and stored as a separate entity.

double-byte character set (DBCS). A font character set that can contain up to 65536 characters. Languages with non-alphabetic writing systems, such as Chinese, Japanese, and Korean, require double-byte character sets.

duplex printing. Pertaining to printing on both sides of a sheet of paper. Contrast with simplex printing.

E

electronic overlay. Synonym for *overlay*.

end user. (1) A person, device, program, or computer system that uses a computer network for the purpose of data processing and information exchange. (T) (2) A person who writes and creates documents. The end user has little or no programming training but knows how to use a terminal for text processing. Examples of end users include secretaries, writers, and engineers.

external formatting. Controls for the placement of data on the page that are embedded outside the actual application program.

F

field. In a record, a specified area used for a particular class of data; for example, a group of character positions used to enter or display wage rates on a screen. (T)

file. (1) A named set of records stored or processed as a unit. (T) (2) 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 operating system has access.

font. A family or assortment of characters of a given size and style; for example, 9-point Sonoran Serif roman medium. (A)

font administrator. A person who is responsible for installing and maintaining the fonts stored in computer resource libraries.

font character set. See *character set*.

font collection. See *TrueType collection*.

font metrics. Measurement information that defines individual character values such as height, width, and space as well as overall font values such as the average and maximum heights and widths of characters. Font metrics can be expressed in specified fixed units, such as pels, or in relative units that are independent of both the resolution and size of the font.

font substitution. When a requested font cannot be found and a different font is used. TrueType fonts are not substituted.

form. (1) The paper on which output data is printed by a line printer or a page printer. (2) A physical sheet of paper. See preprinted form.

form definition. A resource that defines the characteristics of the form which include overlays to be used (if any), text suppression, the position of page data on the form, and the number and modifications of a page. Contrast with page definition.

format. (1) A specified arrangement of such things as characters, fields, and lines, usually used for displays, printouts, or files. (2) To arrange such things as characters, fields, and lines. (3) (v.) To prepare a document for printing in a specified format.

formatter. A computer program that prepares a source document for printing.

forms designer. A person who is responsible for designing electronic or preprinted forms that are

readable, usable, and attractive. The forms designer usually has training in graphics design and in the presentation of information.

ftp. File transfer protocol

fully resolved AFP. See *portable AFP*.

G

GDDM. Graphical Data Display Manager

graphic. Image, text, or a combination of both that can be placed on the printed page.

Graphical Data Display Manager (GDDM). An IBM licensed program containing utilities for creating, saving, editing, and displaying visual data such as page segments, charts, images, vector graphics, composites (of text, graphics, and images), and scanned data.

graphics designer. A person who is responsible for the design and appearance of graphics used in a company's documents. The graphics designer has experience in graphics design as well as in using computers to create graphics.

H

hardware. Physical equipment as opposed to programs, procedures, rules, and associated documentation. (I) (A)   Contrast with software.

host-based computer. (1) In a computer network, a computer that provides end users with services such as computation and data bases and that usually performs network control functions. (T)   (2) The primary or controlling computer in a multiple-computer installation.

I

IBM-supplied PDF mapping program. A PDF mapping program supplied with Infoprint Server and designed to be used with a map object that you create.

image. A pattern of toned and untoned pels that form a picture.

impact printer. A device in which printing results from mechanical impacts. (I) (A)   Contrast with nonimpact printer.

index. (1) A process of segmenting a print file into uniquely identifiable groups of pages (a named collection of sequential pages) for later retrieval. (2) A process of matching reference points within a file and creating structured field tags within the MO:DCA-P document and the separate index object file.

index object file. An index-information file created by Advanced Function Presentation Conversion and Indexing Facility that contains Index Element (IEL) structured fields, which identify the location of the tagged groups in the AFP file. The indexing tags are contained in the Tagged Logical Element (TLE) structured fields.

Intelligent Printer Data Stream (IPDS). A host-to-host printer data stream for Advanced Function Presentation subsystems. It provides an interface to all-points-addressable printers that makes possible the presentation of pages containing an architecturally unlimited mixture of different data types.

intelligent routing. The ability to distribute output from Infoprint Server's PDF subsystem in multiple ways.

interactive. Pertaining to an application in which entries call forth a response from a system or program, as in an inquiry system. An interactive system might also be conversational, implying a continuous dialog between the user and the system. Interactive systems are usually communicated with through terminals, and respond immediately to commands.

interactive environment. An environment in which a terminal user interacts with the system. Contrast with batch environment.

IPDS. Intelligent Printer Data Stream

iSeries. The name of the hardware on which i5/OS runs.

iSeries Information Center. A Web Site that is a source for technical information about the IBM iSeries 400 server. The Information Center is your starting point for all iSeries technical information. The books from the Online Library are part of the Information Center. Occasionally, the information directs you to the iSeries Technical Studio, IBM Redbooks™, and other iSeries Web sites. The iSeries Information Center can be found at `http://www.as400.ibm.com/infocenter`.

L

LAN. Local area network

LAN administrator. A person responsible for installing, configuring, and maintaining Local Area Networks on which are installed workstations and printers.

library. A file or a set of related files; for example, a page definition library containing one or more page definition files.

licensed program. A utility that performs a function for the user and usually interacts with and relies upon system control programming or some other

IBM-provided control program. A licensed program contains logic related to the user's data and is usable or adaptable to meet specific requirements.

line data. Data prepared for printing on a line printer such as an IBM 3800 Model 1 Printing Subsystem. Line data is usually characterized by carriage-control characters and table reference characters. Line data adds blank lines for vertical positioning and a couple of additional carriage control characters to each print record. There are two types of line data: *traditional* and *record format*. When the term "line data" is used in this publication, the information applies to both types of line data, unless otherwise specified. Contrast with *MO:DCA-P data* and *SCS data*.

line data print file. A file that consists of line data, optionally supplemented by a limited set of structured fields.

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

lines per inch (lpi). (1) A unit of measurement for the specification of baseline placement. (2) A measure of the number of lines per vertical inch of paper.

linked font. A TrueType font can be linked to a TrueType font (which is then called a base font) to form an ordered list of fonts that are essentially processed as a single font.

local area network. A data network located on the user's premises in which serial transmission is used for direct data communication among data stations. (T)

logical page. A presentation space. One or more object areas or data blocks can be mapped to a logical page. A logical page has specifiable characteristics, such as size, shape, orientation, and offset and is rectangular in shape. Orientation and offset are specified relative to a medium coordinate system.

lowercase. Pertaining to small letters, as distinguished from capitals; for example, a, b, g, rather than A, B, G.

lpi. Lines per inch

M

magnetic ink character recognition (MICR). Recognition of characters printed with ink that contains particles of a magnetic material.

mail tag. See *routing tag*

map object. An object used with Infoprint Sever that passes values to an IBM-supplied *PDF mapping program*. It is created by using i5/OS panels or APIs. Any time a PDF mapping program is used, it can be replaced with an IBM-supplied PDF mapping program and map object.

mapping program. See *PDF mapping program*

merged stream file. See *portable AFP*.

MICR. Magnetic ink character recognition

Mixed Object Document Content Architecture. A strategic, architected, device-independent data stream for interchanging documents.

mixed-pitch font. A font that simulates a proportionally spaced font. The characters are in a limited set of pitches (for example, 10 pitch, 12 pitch, and 15 pitch).

MO:DCA-P. Mixed Object Document Content Architecture

monospaced font. A font in which the graphic characters have a uniform character increment. Synonymous with uniformly spaced font. Contrast with proportionally spaced font.

multiple-up printing. The printing of more than one page on a single surface of a sheet of paper.

N

nonimpact printer. A device in which printing is not the result of mechanical impacts; for example, thermal printers, electrostatic printers, photographic printers. (I) (A) Contrast with impact printer.

O

object container. A generic MO:DCA-P envelope that can contain some non-OCA objects, such as EPS image objects, PDF single-page objects, and color mapping tables.

object format. The format of AFP resources required for use by PSF. Contrast with source format.

offset stacking. A function that enables the printed output pages to be offset for easy separation of the print jobs.

OGL/370. Overlay Generation Language/370

OnDemand for iSeries. An IBM licensed program that enables you to archive, retrieve, view, and print AFP documents. This application features a graphical user interface.

OpenType font. Often used synonymously with *TrueType fonts*. It is actually an extension of the TrueType font format that adds:
- Support for PostScript outlines
- Better support for international character sets
- Broader support for advanced typographic control

In this document, the term TrueType refers to both TrueType and OpenType fonts.

Operating System/400® (OS/400). An IBM licensed program that can be used as the operating system for the iSeries processor series.

orientation. (1) The angle between the top or bottom edge of the page and the baselines within a column, measured in a clockwise direction. (2) The rotation of an element relative to a fixed reference.

OS/400. Operating System/400

outline font. A font whose graphic character shapes are defined mathematically rather than by raster patterns.

output device. A machine used to print, display, or store the result of data processing.

overlay. A resource that can contain text, image, graphics, and bar code data. An overlay is electronically created in the host processor, stored in a library, and can be merged electronically with variable data on a sheet during printing. See also preprinted form and forms flash.

Overlay Generation Language/370 (OGL/370). An IBM licensed program used to create overlays.

P

page. A collection of data that can be printed on a physical sheet of paper.

page definition. A resource containing a set of formatting controls for printing logical pages of data. Includes controls for number of lines per printed sheet, font selection, print direction, and mapping individual fields in the data to positions on the printed sheets.

page format. A subset of a page definition, containing controls governing the arrangement of text on a page.

page mode. The mode of operation in which the printer can accept a page of data at a time from a host processor to be printed on an all-points addressable output device. Data may consist of pages composed of text, images, overlays, or page segments.

page printer. Any of a class of printers that accepts MO:DCA-P pages, constructed of composed text and images, among other things. Contrast with line printer.

page segment. A resource containing composed text and images, prepared before formatting and included during printing.

PDF mapping program. In Infoprint Server, a program that specifies what to do with the output from the PDF subsystem. This can be a user-created program

or can be IBM-supplied. Using the IBM-supplied mapping program requires a *map object*.

pel. picture element

pel density. The number of pels per unit of linear measurement.

personal computer. A desktop, floor-standing, or portable microcomputer that usually consists of a system unit, a display monitor, a keyboard, one or more diskette drives, internal fixed-disk storage, and an optional printer. Personal computers are designed primarily to give independent computing power to a single user or small businesses. **Note:** Personal computers are designed primarily for stand-alone operation but can be connected to mainframes or networks.

PFU. Print Format Utility

physical page. The side of a sheet of paper that is to be printed on.

pica. A unit of about 1/6 inch used in measuring typographical material.

picture element. The smallest area that can be individually toned on a printing medium or on a display surface.

pitch. characters per inch

plotter. An output unit that presents data in the form of a two-dimensional graphic representation. (I) (A)

point. In printing, a unit of about 1/72 of an inch used in measuring typographical material. Each pica contains 12 points.

point size. The height of a font in points.

portable AFP. AFP data packaged with the resources necessary for printing and indexing information, if any exists. The Infoprint Server for iSeries Create AFP Data command and IBM Content Manager OnDemand for iSeries create fully-resolved AFP data.

postprocessing option. A hardware device that attaches to the output side of a printer; for example, an envelope stuffer, binder, or stapler.

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

PPDS. Page Printer Data Stream

preprinted form. A sheet of paper containing a preprinted design of constant data. Variable data can be merged on such a form.

preprocessing option. A hardware device that attaches to the input side of a printer; for example, a paper-roll feed or multiple input bins.

print data set. Synonym for print file.

print definition. Contains instructions for transforming simple SCS print output to advanced AFP output. A print definition includes the specifications for remapping existing print data, defining and creating different page formats and copies, and adding document elements such as overlays, images, fonts, bar codes, and constants.

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

Print Format Utility (PFU). Part of the Advanced Function Presentation Utilities for iSeries. This utility enables you to print data from database file members in various forms, such as text or bar codes.

print job. The data to be printed that is submitted to Print Services Facility by the user.

Print Services Facility (PSF). An IBM licensed program that produces printer commands from the data sent to it.

printer driver. A program that passes commands and resources with a data stream from the system spool to tell the printer how to print the page.

printer file. An i5/OS object that provides printer output attributes.

proportionally spaced font. A font in which the characters have different character increments. Graphic character widths vary with the size of each graphic character. This allows for even spacing between printed characters and eliminates excess space around narrow characters, such as the letter i. Contract with uniformly spaced font.

PSF. *Print Services Facility*

PSF configuration object. i5/OS object that lets you define configuration parameters that you cannot specify with the device description CRTDEVPRT or CHGDEVPRT commands.

R

raster font. (1) A font created by a series of pels (picture elements) arranged in scan lines to form an image. (2) A font in which the characters are defined directly by the raster bit map.

RAT. *resource access table*.

raster graphics. Computer graphics in which a display image is composed of an array of picture elements (pels) arranged in rows and columns. (I) (A) Contrast with vector graphics.

raster pattern. A series of picture elements (pels) in scan lines to form an image. See also page segment.

record. A collection of related data or words, treated as a unit; for example, in stock control, each invoice could constitute one record.

record-based file. See *database file*.

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

Redbook. IBM Redbooks typically provide positioning and value guidance, installation and implementation experiences, typical solution scenarios, and step-by-step "how-to" guidelines. They often include sample code and other support materials that are available as downloads, along with the Redbooks, from the IBM Redbooks Web Page: www.ibm.com/redbooks.

remote printer. A device that prints in a location away from the centralized data processing center.

resource. A collection of printing instructions and sometimes data to be printed consisting entirely of structured fields. A resource can be stored as a member of a library and can be called for by Print Services Facility when needed. Coded fonts, font character sets, code pages, page segments, overlays, form definitions, and page definitions are all resources.

resource access table. A table in a resource library that maps resource names specified in the MO:DCA data stream to information used to find and process the resource on a given system. This table is created when you use the Font Installer.

resource library. (1) A collection of related files. (2) A place to store resources such as form definitions, page definitions, page segments, fonts, and overlays.

rotation. The number of degrees a character is rotated relative to the print direction. One of four directions that define the orientation of text relative to a sheet, page, overlay, text block, or page segment.

routing tag. A keyword or valid e-mail address (in the form *name@domain*) used with the PDF subsystem. If the routing tag is a keyword, it must be mapped to one or more valid e-mail addresses or other information by a user-defined PDF mapping program.

S

scanner. A device that examines a spatial pattern one part after another and generates analog or digital

signals corresponding to the pattern. Scanners are often used in mark sensing, pattern recognition, or character recognition. (I) (A)

SCS data. SNA character string

simplex printing. Printing on only one side of the paper. Contrast with duplex printing.

SBCS. Single-byte character set

single-byte character set (SBCS). A character set that contains up to 256 characters. Single-byte character sets for languages with alphabetic writing systems, such as English, Greek, and Arabic.

SNA. Systems Network Architecture

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

software. Programs, procedures, rules, and any associated documentation pertaining to the operation of a system. (T) (A) Contrast with hardware.

source format. The format of an AFP resource, other than fonts, used by AFP resource management programs. Contrast with object format.

spooled file. An i5/OS file that contains output for the printer.

spooling (simultaneous peripheral operation online). (1) The use of auxiliary storage as a buffer storage to reduce processing delays when transferring data between peripheral equipment and the processors of a computer. (I) (A) (2) The reading of input data streams and the writing of output data streams on auxiliary storage devices, concurrently with job execution, in a format convenient for later processing or output operations.

stream file. A randomly accessible sequence of bytes with no further structure imposed by the system. For example, a document, PC file, or UNIX file. Common uses are images, text, audio, and video files. The i5/OS object type is *STMF. Contrast with *database file*.

structured field. A self-identifying, variable-length record, which can have a content portion that provides control information, data, or both.

syntax. The rules and keywords that govern the use of a programming language.

system printer. The printer used for any printed output that is not specifically directed to another printer.

system programmer. A programmer who is responsible for writing programs for the functions of the computer operating system and who has a

thorough knowledge of the operating system. The system programmer installs and maintains AFP software in the i5/OS environment.

Systems Network Architecture (SNA). In IBM networks, the description of the layered logical structure, formats, protocols, and operational sequences that are used for transmitting information units through networks, as well as controlling the configuration and operation of networks.

T

TCP/IP. Transmission Control Protocol/Internet Protocol

terminal. A device, usually equipped with a keyboard and some kind of display, capable of sending and receiving information over a communication channel.

text. A graphic representation of information about an output medium. Text consists of alphanumeric characters and symbols arranged in paragraphs, tables, columns, or other shapes.

text-formatting program. A program that determines the manner in which data will be placed on a page.

text orientation. A description of the appearance of text as a combination of inline and baseline directions and character rotation.

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

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

troff. A phototypesetting utility originally designed to support a Graphics Systems phototypesetting machine but that is now capable of supporting a variety of phototypesetters. The utility produces data in a format called ditroff.

TrueType collection. A file that consists of multiple TrueType or OpenType fonts. The MO:DCA data stream references a font by font name, which is resolved to a font file or a font in a collection file.

TrueType font. A font format based on scalable outline technology with flexible hinting. Glyph shapes are based on quadratic curves. The font is described with a set of tables contained in a TrueType Font File. In this document, the term TrueType refers to both TrueType and OpenType fonts.

type family. A collection of fonts of a common typeface that vary in size and style.

type font. Type of a given size and style; for example, 10-point Sonoran Serif roman medium. (A)

typeface. A collection of fonts all having the same style, weight, and width; each font differs from the others by point size or type family.

typeset. (1) To arrange the type on a page for printing. (2) Pertaining to material that has been set in type.

typographic font. A typeface originally designed for typesetting systems. Contrast with mixed-pitch font, uniformly spaced font. Synonym for proportionally spaced font.

U

underscore. A line printed under a character. To underline.

Unicode . Unicode is the universal standard that defines a single encoding scheme to represent all of the characters used in all of the world's languages. This is one of the major encodings supported in TrueType fonts, and it forms the basis for the TrueType support in AFP systems. The AFP datastream supports Unicode UTF-16 and UTF-8.

Unicode-enabled font. A Unicode-enabled font has these characteristics:

- It contains a Microsoft Unicode subtable identified by platform ID = 3 (Microsoft) and platform-specific encoding ID = 1 (Unicode, UTF-16).
- It specifies a full font name (Name ID 4) using the same encoding in the naming table.

TrueType and OpenType fonts that are to be installed and referenced in an AFP system must be Unicode-enabled.

uniformly spaced font. A font in which the characters have the same character increment. Synonymous with monospaced fonts. Contrast with proportionally spaced font and typographic font.

uppercase. Pertaining to capital letters, as distinguished from small letters; for example, A, B, G, rather than a, b, g.

V

variable data. (1) In programming languages, a language object that may take different values, one at a time. The values of a variable are usually restricted to a certain data type. (I) (2) A quantity that can assume any of a given set of values. (A) (3) Used to represent a data item whose value can be changed while the program is running. Contrast with constant data.

vector. In computer graphics, a directed line segment.

vector graphics. Computer graphics in which display images are generated from display commands and coordinate data. (I) (A) Contrast with raster graphics.

W

word processing. The entry, modification, formatting, display, and printing of text on personal computers, microprocessors, and stand-alone word processors.

Bibliography

This bibliography lists the titles of publications containing additional information about the i5/OS operating system, Advanced Function Presentation, and related products.

The titles and order numbers may change from time to time. To verify the current title or order number, consult your IBM marketing representative.

You can obtain many of the publications listed in this bibliography from the Printing Systems Digital Library:

`http://www.ibm.com/printers/r5psc.nsf/web/manuals`

or the Online Publications Website:

`http://www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi`

Some of the unlisted publications, such as the API references have been integrated into the iSeries Infocenter:

`http://www.as400.ibm.com/infocenter`

You can obtain Redbooks from the Redbooks Web Page:

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

Advanced Function Presentation

Publication	Order Number
Advanced Function Presentation: Printer Summary	G544-3135
Advanced Function Presentation: Printer Information	G544-3290
Advanced Function Presentation: Programming Guide and Line Data Reference	S544-3884
AFP Conversion and Indexing Facility: User's Guide	G544-5285
Guide to Advanced Function Presentation	G544-3876
IBM Online Library: Printing and Publishing Collection	SK2T-2921

Business Graphics Utility

Publication	Order Number
BGU User's Guide and Reference	SC09-1408-00

Data Stream and Object Architectures

Publication	Order Number
Data Stream and Object Architectures: MO:DCA Reference	SC31-6802
Intelligent Printer Data Stream Reference	S544-3417

Publication	Order Number
Data Stream and Object Architectures: Bar Code Object Content Architecture (BCOCA) Reference	S544-3766
Data Stream and Object Architectures: Font Object Content Architecture (FOCA) Reference	S544-3285
Presentation Text Object Content Architecture Reference	SC31-6803
Graphics Object Content Architecture Reference	SC31-6804
Data Stream and Object Architectures: Image Object Content Architecture (IOCA) Reference	SC31-6805

Facsimile Support for iSeries

Publication	Order Number
Facsimile Support for AS/400 Programmer's Guide and Reference	SC41-0656-01
Facsimile Support for AS/400 Installation Guide	SC41-0654-01
Facsimile Support/400 User's Guide	SC41-0655-01

GDDM

Publication	Order Number
GDDM Programming Guide	SC41-0536-00
GDDM Reference	SC41-3718-00

Fonts

Publication	Order Number
IBM Infoprint Fonts: Introduction to Type Transformer and Utilities for Windows	G544-5853-00
Infoprint Fonts: Creating User-Defined Characters	G544-5854-00
IBM Infoprint Fonts: Font Summary	S544-5846-00
IBM AFP Fonts: Font Summary for AFP Font Collection	S544-5633
IBM AFP Fonts: Technical Reference for Expanded Core Fonts	S544-5228
AFP Font Collection: Type Transformer for Windows User's Guide	G544-5726
AFP Fonts: Technical Reference for Code Pages	S544-3802
Using OpenType Fonts in an AFP System	G544-5876

IBM Content Manager OnDemand for iSeries

Publication	Order Number
IBM Content Manager OnDemand for iSeries Common Server Administration Guide	SC27-1161-03

Infoprint Designer for iSeries

Publication	Order Number
Infoprint Designer for iSeries: Getting Started	G544-5773-03

Infoprint Server for iSeries

Publication	Order Number
Infoprint Server for iSeries: Introduction and Planning Guide	G544-5774-03
Infoprint Server for iSeries: User's Guide	G544-5775-05

i5/OS

Access information about i5/OS in the iSeries Information Center.

Publication	Order Number
AFP Utilities for iSeries User's Guide	S544-5349-02

Redbooks

Redbooks and Redpapers are available online at `www.ibm.com/redbooks/`.

Publication	Order Number
How to Replace OfficeVision/400 in Your Applications: Looking at Domino for AS/400 and AS/400 Alternatives	SG24-5406
IBM AS/400 Printing II	GG24-3704
IBM AS/400 Printing III	GG24-4028
IBM AS/400 Printing IV	GG24-4389
IBM iSeries Printing V	SG24-2160
IBM @server iSeries Printing VI: Delivering the Output of e-business	SG24-6250
IBM @server iSeries Printing VII: Infoprint Server Implementation	REDP-3752
eServer i5 and iSeries System Handbook, i5/OS V5R3	GA19-5486

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