Infoprint Transforms to AFP for z/OS

Version 2.1
Infoprint Transforms to AFP for z/OS

Version 2.1
Third edition (July 2008)
This edition applies to Version 2 Release 1 of IBM Infoprint Transforms to AFP for z/OS (program number 5655–N60). This edition applies to all subsequent releases and modifications until otherwise indicated in new editions.
This edition replaces G550–0443–01.

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U.S.A.

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About this book

This book describes Version 2 Release 1 (V2.1) of IBM® Infoprint® Transforms to AFP™ for z/OS® (program number 5655-N60).

With this product, you can transform documents to Advanced Function Presentation™ (AFP) format from:
• HP Printer Control Language (PCL)
• Adobe® Portable Document Format (PDF)
• Adobe PostScript®
• SAP R/3 System Generic Output Format (SAPGOF)

This transform product replaces the equivalent features of IBM z/OS Infoprint Server Transforms Version 1 Release 1 (5697-F51).

The transforms require Infoprint Server, which is an element of z/OS Version 1 (5694-A01), and z/OS.e Version 1 (5655-G52). They run on z/OS V1R7 and higher.

Who should read this book

This book is for anyone who needs to transform documents to AFP, system programmers who customize the transform products, administrators responsible for maintaining the Infoprint Server Printer Inventory, and diagnosticians who must diagnose transform errors.

Readers should be familiar with Infoprint Server, AFP, z/OS UNIX® System Services, and z/OS job control language (JCL).

How this book is organized

This book is divided into these chapters:
• Introduction
• Using transforms
• Customizing transforms
• Administering transforms
• Diagnosing errors
• Messages
• Migrating from Infoprint Server Transforms V1.1

How to read syntax diagrams

This section explains the general notations that this book uses in syntax diagrams. For ease of reading, this book breaks some examples into several lines. However, when you enter a command, enter it all on one line. Do not press Enter until you have typed the entire command.

<table>
<thead>
<tr>
<th>This notation:</th>
<th>Means:</th>
<th>You enter:</th>
<th>For example:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apostrophes</td>
<td>String</td>
<td>As shown</td>
<td>SEND '123'</td>
</tr>
<tr>
<td>Bold</td>
<td>Keyword</td>
<td>As shown</td>
<td>CLASS</td>
</tr>
</tbody>
</table>

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### Where to find more information

This section describes where to find related information.

### Web sites

These Web sites contain related information:

<table>
<thead>
<tr>
<th>This site:</th>
<th>Contains:</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.ibm.com/printers/download.html">http://www.ibm.com/printers/download.html</a></td>
<td>Downloads, including:</td>
</tr>
<tr>
<td></td>
<td>- Infoprint Port Monitor</td>
</tr>
<tr>
<td></td>
<td>- AFP Viewer plug-in</td>
</tr>
<tr>
<td></td>
<td>- AFP Printer Driver</td>
</tr>
<tr>
<td></td>
<td>- <code>lprafp</code> command</td>
</tr>
<tr>
<td></td>
<td>- All z/OS books</td>
</tr>
<tr>
<td></td>
<td>- Updates from APARs and PTFs</td>
</tr>
</tbody>
</table>
Using LookAt to look up message explanations

LookAt is an online facility that lets you look up explanations for most of the IBM messages you encounter, as well as for some system abends and codes. Using LookAt to find information is faster than a conventional search because in most cases LookAt goes directly to the message explanation.

You can use LookAt from these locations to find IBM message explanations for z/OS elements and features, z/VM®, VSE/ESA™, and Clusters for AIX® and Linux™:

- Your z/OS TSO/E host system. You can install code on your z/OS or z/OS.e systems to access IBM message explanations using LookAt from a TSO/E command line (for example: TSO/E prompt, ISPF, or z/OS UNIX System Services).
- Your Microsoft® Windows® workstation. You can install LookAt directly from the z/OS Collection (SK3T-4269) or the z/OS and Software Products DVD Collection (SK3T-4271) and use it from the resulting Windows graphical user interface (GUI). The command prompt (also known as the DOS > command line) version can still be used from the directory in which you install the Windows version of LookAt.
- Your wireless handheld device. You can use the LookAt Mobile Edition from [www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/lookatm.html](http://www.ibm.com/servers/eserver/zseries/zos/bkserv/lookat/lookatm.html) with a handheld device that has wireless access and an Internet browser (for example: Internet Explorer for Pocket PCs, Blazer or Eudora for Palm OS, or Opera for Linux handheld devices).

You can obtain code to install LookAt on your host system or Microsoft Windows workstation from:

- A CD-ROM in the z/OS Collection (SK3T-4269).
- The z/OS and Software Products DVD Collection (SK3T-4271).
- The LookAt Web site (click Download and then select the platform, release, collection, and location that suit your needs). More information is available in the LOOKAT.ME files available during the download process.

Using IBM Health Checker for z/OS

IBM Health Checker for z/OS is a z/OS component that installations can use to gather information about their system environment and system parameters to help identify potential configuration problems before they impact availability or cause outages. Individual products, z/OS components, or ISV software can provide checks that take advantage of the IBM Health Checker for z/OS framework. This book refers to checks or messages associated with this component.

SDSF also provides functions to simplify the management of checks. See \textit{z/OS SDSF Operation and Customization} for additional information.

**Web sites**

These Web sites contain related information:

<table>
<thead>
<tr>
<th>This site:</th>
<th>Contains:</th>
</tr>
</thead>
<tbody>
<tr>
<td><a href="http://www.ibm.com/printers/download.html">http://www.ibm.com/printers/download.html</a></td>
<td>Downloads, including:</td>
</tr>
<tr>
<td></td>
<td>• Infoprint Port Monitor</td>
</tr>
<tr>
<td></td>
<td>• AFP Viewer plug-in</td>
</tr>
<tr>
<td></td>
<td>• AFP Printer Driver</td>
</tr>
<tr>
<td></td>
<td>• \texttt{lprafp} command</td>
</tr>
<tr>
<td><a href="http://www.ibm.com/systems/z/os/zos/">http://www.ibm.com/systems/z/os/zos/</a></td>
<td>Information about z/OS</td>
</tr>
<tr>
<td><a href="http://www.ibm.com/systems/z/os/zos/bbserv/">http://www.ibm.com/systems/z/os/zos/bbserv/</a></td>
<td>z/OS documentation, including:</td>
</tr>
<tr>
<td></td>
<td>• All z/OS books</td>
</tr>
<tr>
<td></td>
<td>• Updates from APARs and PTFs</td>
</tr>
<tr>
<td><a href="http://www.ibm.com/redbooks">http://www.ibm.com/redbooks</a></td>
<td>IBM redbooks, including a book for Infoprint Server</td>
</tr>
<tr>
<td><a href="http://www.ibm.com/servers/eserver/zseries/zos/unix">http://www.ibm.com/servers/eserver/zseries/zos/unix</a></td>
<td>Information about z/OS UNIX System Services</td>
</tr>
</tbody>
</table>

**Preventive Service Planning information**

Before installing Infoprint transforms, you should review the current Preventive Service Planning (PSP) information, also called the \textit{PSP bucket}. You should also periodically review the current PSP information.

The PSP upgrade IDs and subsets are:

\textit{Table 1. PSP upgrade ID}s and subsets

<table>
<thead>
<tr>
<th>Transform</th>
<th>Upgrade ID</th>
<th>Subset</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Infoprint Transforms to AFP</td>
<td>5655N60</td>
<td>HXFR200</td>
</tr>
</tbody>
</table>

To obtain the current PSP bucket, contact the IBM Support Center or use z/OS SoftwareXcel (IBMLink\textsuperscript{TM}). If you obtained z/OS as part of a CBPDO, HOLDDATA and PSP information is included on the CBPDO tape. However, this information might not be current if the CBPDO tape was shipped several weeks prior to installation.

**Books and other information**

This section lists related books and other information that can help you use Infoprint Server, Infoprint Transforms V2.1, and other IBM transform products. For books for all z/OS products, see \textit{z/OS Information Roadmap}.

\textit{Table 2. Books for Infoprint Server and other IBM transform products}

<table>
<thead>
<tr>
<th>Book</th>
<th>Form number</th>
</tr>
</thead>
<tbody>
<tr>
<td>\textit{z/OS Infoprint Server Introduction}</td>
<td>S544-5742</td>
</tr>
</tbody>
</table>

Introduces Infoprint Server. This book contains printing scenarios that show how you can use Infoprint Server in your installation.
### Table 2. Books for Infoprint Server and other IBM transform products  (continued)

<table>
<thead>
<tr>
<th><strong>Book</strong></th>
<th><strong>Form number</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>z/OS Infoprint Server Customization</strong></td>
<td>S544-5744</td>
</tr>
<tr>
<td>Describes customization tasks for Infoprint Server. This book describes Infoprint Server environment variables, configuration files, startup procedures, how to write exit routines and filter programs, and how to use the Infoprint Server API.</td>
<td></td>
</tr>
<tr>
<td><strong>z/OS Infoprint Server Operation and Administration</strong></td>
<td>S544-5745</td>
</tr>
<tr>
<td>Describes operator procedures and administrative tasks for Infoprint Server. This book describes how to start and stop Infoprint Server and how operators can use Infoprint Central. It describes how administrators can create entries in the Printer Inventory using either ISPF panels or the Printer Inventory Definition Utility (PIDU) program and define NetSpool™ printer LUs to VTAM®.</td>
<td></td>
</tr>
<tr>
<td><strong>z/OS Infoprint Server User’s Guide</strong></td>
<td>S544-5746</td>
</tr>
<tr>
<td>Describes user tasks for Infoprint Server. This book describes how to submit print jobs from remote systems (including Windows systems), the local z/OS system, and Virtual Telecommunications Access Method (VTAM) applications. It describes z/OS UNIX commands; the AOPPRINT JCL procedure; the AOPBATCH program; DD and OUTPUT JCL parameters that Infoprint Server supports; and how to download and install the Infoprint Port Monitor for Windows.</td>
<td></td>
</tr>
<tr>
<td><strong>z/OS Infoprint Server Messages and Diagnosis</strong></td>
<td>S544-5747</td>
</tr>
<tr>
<td>Describes messages from Infoprint Server. This book also describes how to use Infoprint Server tracing facilities to diagnose and report errors.</td>
<td></td>
</tr>
<tr>
<td><strong>Infoprint XML Extender for z/OS</strong></td>
<td>S544-5855</td>
</tr>
<tr>
<td>Describes how to plan for, configure, and submit jobs with Infoprint XML Extender for z/OS.</td>
<td></td>
</tr>
<tr>
<td><strong>Infoprint XT Extender for z/OS: Customization and Usage</strong></td>
<td>S544-5879</td>
</tr>
<tr>
<td>Describes how to customize and use Infoprint XT™ Extender for z/OS.</td>
<td></td>
</tr>
</tbody>
</table>

### Table 3. Books for Infoprint Transforms V2.1

<table>
<thead>
<tr>
<th><strong>Book</strong></th>
<th><strong>Form number</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infoprint Transforms to AFP for z/OS</strong></td>
<td>G550-0443</td>
</tr>
<tr>
<td>Describes IBM Infoprint Transforms to AFP V2.1 for z/OS. This book describes using transforms, customizing transforms, administering transforms, diagnosing errors, messages, and migrating from Infoprint Server Transforms V1.1.</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Books for Infoprint Transforms V2.1 (continued)

<table>
<thead>
<tr>
<th>Book</th>
<th>Form number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infoprint Transforms from AFP for z/OS</td>
<td>G550-0444</td>
</tr>
</tbody>
</table>

Describes V2.1 of these IBM products:
- Infoprint Transform for AFP to HP PCL for z/OS
- Infoprint Transform for AFP to Adobe PDF for z/OS
- Infoprint Transform for AFP to Adobe PostScript for z/OS

This book describes using transforms, customizing transforms, administering transforms, diagnosing errors, messages, and migrating from Infoprint Server Transforms V1.1.

Table 4. Licensed program specifications for Infoprint Transforms V2.1

<table>
<thead>
<tr>
<th>Licensed program specification</th>
<th>Form number</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Infoprint Transforms to AFP for z/OS</td>
<td>G550-0445</td>
</tr>
<tr>
<td>IBM Infoprint Transform for AFP to HP PCL for z/OS</td>
<td>G550-0446</td>
</tr>
<tr>
<td>IBM Infoprint Transform for AFP to Adobe PDF for z/OS</td>
<td>G550-0492</td>
</tr>
<tr>
<td>IBM Infoprint Transform for AFP to Adobe PostScript for z/OS</td>
<td>G550-0493</td>
</tr>
<tr>
<td>IBM Infoprint Coaxial Printer Support for z/OS</td>
<td>G550-0447</td>
</tr>
</tbody>
</table>

Table 5. Program directories for Infoprint Transforms V2.1

<table>
<thead>
<tr>
<th>Program directory</th>
<th>Form number</th>
</tr>
</thead>
<tbody>
<tr>
<td>IBM Infoprint Transforms to AFP for z/OS</td>
<td>GI10-0276</td>
</tr>
<tr>
<td>IBM Infoprint Transform for AFP to HP PCL for z/OS</td>
<td>GI10-0277</td>
</tr>
<tr>
<td>IBM Infoprint Transform for AFP to Adobe PDF for z/OS</td>
<td>GI10-0279</td>
</tr>
<tr>
<td>IBM Infoprint Transform for AFP to Adobe PostScript for z/OS</td>
<td>GI10-0280</td>
</tr>
<tr>
<td>IBM Infoprint Coaxial Printer Support for z/OS</td>
<td>GI10-0278</td>
</tr>
</tbody>
</table>
Summary of changes

Summary of changes for G550-0443-02

This book contains information previously presented in G550-0443-01. It contains information about functions that have been added in these APARs/PTFs:

- APAR OA21263/PTF UA37332
- APAR OA21390/PTF UA35787
- APAR OA23320/PTF UA41456
- APAR OA24581/PTF UA41402
- PTF for APAR OA24261

New information

- A limitation has been added that the PDF to AFP and PostScript to AFP transforms cannot transform concatenated PDF or PostScript files. See "PDF to AFP transform limitations" on page 8 and "PostScript to AFP transform limitations" on page 9. An example has been added to show how to use AOPBATCH to transform multiple files in separate steps. See "AOPBATCH examples" on page 38.

- The -T option has been added to the pcl2afp, pdf2afp, and ps2afp transform commands. See "Running traces" on page 88.

- Environment variable AOP_FAIL_ON_ERROR has been added for the PCL to AFP transform. See "Environment variables for the PCL to AFP transform" on page 45.

- Environment variable AOP_TRIM has been added for the PCL to AFP, PostScript to AFP, and PDF to AFP transforms. See "Environment variables for the PCL to AFP transform" on page 45 and "Environment variables for the PDF to AFP and PostScript to AFP transforms" on page 53.

- These messages have been added: AOP2505E, AOP2506W. See "Messages" on page 93.

- The PCL to AFP transform has additional built-in fonts. See Table 15 on page 111.

Changed information

- The transforms are no longer supported on z/OS V1R4, z/OS V1R5, and z/OS V1R6 because z/OS no longer supports these releases.

- The PCL to AFP transform no longer creates concatenated overlays or page segments for multi-page input files. The transform now creates an overlay or page segment only for the first page. See the description of the -t option in "pcl2afp—Transform PCL data to AFP data" on page 13.

- The PCL to AFP transform does not support the AOP_FONT_SUBSTITUTION_MESSAGES environment variable. The previous edition incorrectly indicated that the PCL to AFP transform supported this environment variable.

Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.
Summary of changes for G550-0443-01

This book contains information previously presented in G550-0443-00. It contains information about functions that have been added in these PTFs:

- UA27523
- UA29461
- UA29296
- UA32863

New information

- Information about font-substitution messages has been added. See Chapter 1, “Introduction,” on page 1 and “Using new functions” on page 105.
- Information about how to continue parameter fields in JCL has been added, and the AOPBATCH examples now show how to specify job attributes in the PARM parameter. See “AOPBATCH examples” on page 38.
- Information about how to calculate the size of the AFP data stream has been added. See “Calculating the size of the AFP data stream” on page 41.
- Environment variable AOP_FONT_SUBSTITUTION_MESSAGES has been added. See “Environment variables for the PDF to AFP and PostScript to AFP transforms” on page 53.
- Information has been added about the Language Environment® (LE) run-time options that the PCL to AFP, PDF to AFP, and PostScript to AFP transforms set. See “Changing Language Environment run-time options” on page 49 and “Changing Language Environment run-time options” on page 57.
- Environment variables _CEE_DMPTARG and AOP_FAIL_ON_ERROR have been added. See “Environment variables for the PDF to AFP and PostScript to AFP transforms” on page 53.
- These messages have been added: AOP2500W, AOP2501E, AOP2502I, AOP2503I, AOP2504E. See “Messages” on page 93.

Changed information

- The transforms to AFP can now transform data streams in PDF 1.6 and lower levels.
- The description of the AOP_RECLEN environment variable has been changed. See “Environment variables for the PCL to AFP transform” on page 45 and “Environment variables for the PDF to AFP and PostScript to AFP transforms” on page 53.
- Message AOP2026E has been changed to AOP2026W. The text and description of the message have been modified. See “Messages” on page 93.

This book contains terminology, maintenance, and editorial changes, including changes to improve consistency and retrievability. Technical changes or additions to the text and illustrations are indicated by a vertical line to the left of the change.
Chapter 1. Introduction

This chapter introduces Version 2 Release 1 (V2.1) of IBM Infoprint Transforms to AFP for z/OS (program number 5655-N60).

This product provides data-stream transforms that let you transform documents to Advanced Function Presentation (AFP) format from other data stream formats. These transforms let you print non-AFP data on AFP printers, also known as Intelligent Printer Data Stream™ (IPDS™) printers. You can transform documents to AFP format from:

- HP Printer Control Language (PCL)
- Adobe Portable Document Format (PDF)
- Adobe PostScript
- SAP R/3 System Generic Output Format (SAPGOF)

What is different?

This transform product is a newer version of IBM z/OS Infoprint Server Transforms Version 1 Release 1. It replaces the PCL to AFP, PDF to AFP, PostScript to AFP, and SAP to AFP features.

The main new things that you can do in the newer version of the transforms to AFP are:

- Transform documents from a newer level of PCL
- Transform documents from a newer level of PDF
- Obtain traces that help IBM diagnose transform problems

Transform names and levels

The names of the transforms to AFP and the levels of data streams that they transform are:

<table>
<thead>
<tr>
<th>This transform:</th>
<th>Transforms to AFP from these levels:</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCL to AFP</td>
<td>PCL 6 (XL, 5, 5e, 5c)</td>
</tr>
<tr>
<td>PDF to AFP</td>
<td>PDF 1.6 and lower levels</td>
</tr>
<tr>
<td>PostScript to AFP</td>
<td>PostScript Language Level 3</td>
</tr>
<tr>
<td>SAP to AFP</td>
<td>SAP R/3 SAPGOF Release 4.6C</td>
</tr>
</tbody>
</table>

Using transforms with Infoprint Server

This section describes how you can use the transforms together with Infoprint Server to meet your printing needs. It describes these scenarios:

- Printing Web documents on AFP printers
- Printing PDF documents on AFP printers
- Printing SAP R/3 documents on AFP printers

Printing Web documents on AFP printers

A company wants to print Web-based documents on an AFP printer. Here is how the company can use the PCL to AFP transform, Infoprint Server, and Print Services Facility™ (PSF) to meet its requirement:
1. The user installs the Infoprint Port Monitor on her Windows system and configures it to print on the AFP printer. The user associates a PCL driver with the Infoprint port.

2. The user views the Web-based document using a browser, such as Microsoft Internet Explorer. The user prints the document using the standard print-submission method that the browser provides, selecting the printer configured at the Infoprint port.

   As an option, the user specifies Infoprint Server job attributes in the Infoprint Port Monitor window. For example, the user might specify distribution information for PSF to print on the printer’s separator page and the name of a form definition for PSF to use when it prints the document.

3. The PCL driver associated with the Windows printer creates a document in PCL format.

4. The Infoprint Port Monitor sends the PCL document and job attributes over the TCP/IP network to Infoprint Server.

5. Infoprint Server determines that it needs to call the PCL to AFP transform. The transform converts the PCL document to AFP format.

6. Infoprint Server writes the AFP document to an output data set on the JES spool.

   Infoprint Server also specifies JES output parameters that route the output data set to the PSF-controlled AFP printer and tell PSF how to process the document. For example, Infoprint Server specifies distribution information and the name of the form definition in JES output parameters.

7. PSF selects the output data set from the JES spool. It uses the form definition to process the AFP document and sends it to the AFP printer.

   Figure 1 shows how to print a Web document on an AFP printer.

---

**Printing PDF documents on AFP printers**

A company wants to print PDF documents on a high-speed AFP printer. Here is how the company can use the PDF to AFP transform, Infoprint Server, and PSF to meet its requirement:

1. The user installs the `lprafp` command on his Windows system. Using the command, the user submits the PDF document to Infoprint Server and specifies the name of the AFP printer on the command.

   As an option, the user specifies Infoprint Server job attributes on the `lprafp` command. For example, the user might specify the number of copies and the name of a form definition for PSF to use when it prints the document.

2. The `lprafp` command sends the PDF document and job attributes over the TCP/IP network to Infoprint Server.
3. Infoprint Server determines that it needs to call the PDF to AFP transform. The transform converts the PDF document to AFP format.

4. Infoprint Server writes the AFP document to an output data set on the JES spool.
   Infoprint Server also specifies JES output parameters that route the output data set to the PSF-controlled AFP printer and tell PSF how to process the document. For example, Infoprint Server specifies the number of copies and the name of the form definition in JES output parameters.

5. PSF selects the output data set from the JES spool. It uses the form definition to process the AFP document and sends it to the AFP printer.

Figure 2 shows how to print a PDF document on an AFP printer.

---

**Printing SAP R/3 documents on AFP printers**

A company wants to print purchase orders created by SAP R/3 applications on a high-speed AFP printer. Here is how the company can use the SAP to AFP transform, Infoprint Server, the SAP R/3 Application Server for z/OS, and PSF to meet its requirement:

1. Using the SAP R/3 GUI, a user submits an SAP SAPGOF (ABAP or SAP OTF format) document for printing on an SAP R/3 output device that the SAP R/3 administrator has associated with a printer defined to Infoprint Server.
   The SAP R/3 application server sends the document over the TCP/IP network to the spool work process of the SAP R/3 Application Server for z/OS. (The spool work process must run on the same system as Infoprint Server.)

2. The SAP R/3 Application Server’s spool work process submits the print request to the Infoprint Server SAP Output Management System (OMS).

3. Infoprint Server determines that it needs to call the SAP to AFP transform.

4. The SAP to AFP transform converts the SAP R/3 OTF data to AFP format and ABAP data to line data format. The transform selects appropriate AFP resources, such as a form definition, for PSF to use when it prints the document.

5. Infoprint Server writes the AFP document to an output data set on the JES spool.
   Infoprint Server also specifies JES output parameters that route the output data set to the AFP printer and tell PSF how to process the document. For example, the transform specifies the name of the form definition in a JES output parameter.

6. PSF selects the output data set from the JES spool. It uses the form definition to process the AFP document and sends it to the AFP printer.
When the data set finishes printing or is deleted from the JES spool, Infoprint Server sends notification back to the SAP application server that submitted the print request. The notification indicates whether the data set printed successfully.

Figure 3 shows how to print an SAP R/3 document on an AFP printer.

**Methods for transforming documents**

You can use either of these methods to transform documents to AFP:

**z/OS UNIX transform commands**

z/OS UNIX System Services users can use transform commands to convert documents to AFP format from another format without printing the documents. You can run the transform commands from the z/OS UNIX command line, or you can use the Infoprint Server AOPBATCH program to run them.

You might want to transform documents without printing them if you intend to print a document many times. In this case, it is more efficient to transform the document once and print the output than to transform the document every time you print it.

You can use these transform commands:

- **pcl2afp** For PCL to AFP
- **pdf2afp** For PDF to AFP
- **ps2afp** For PostScript to AFP
- **sap2afp** For SAP to AFP

The input document and the output AFP document can be in an MVS™ data set or in a z/OS UNIX file.

For example, to transform the PostScript document `myfile.ps` to an AFP document named `myfile.afp`, enter:

```
ps2afp -o myfile.afp myfile.ps
```

**Printer definitions**

The administrator can specify transform filters in printer definitions in the Infoprint Server Printer Inventory. When you do this, Infoprint Server automatically calls the appropriate transform filter before it prints the document or sends it to an e-mail destination. You use this method when you want to transform and print AFP documents but not save the transformed output.
For example, suppose that the administrator has configured a printer definition named “myprinter” to use the PDF to AFP transform filter:

- You can use the z/OS UNIX `lp` command to transform and print a PDF document using this printer definition. For example, to transform and print a PDF document in file `myfile.pdf`, enter this z/OS UNIX command:
  
  ```
  lp -d myprinter myfile.pdf
  ```

- You can transform and print the PDF output of a batch job using the Print Interface subsystem and this printer definition. For example, to transform and print a PDF document created by a batch program using the subsystem named AOP1, submit this JCL:

  ```
  //MYJOB JOB ...
  //STEP1 EXEC PGM=USERA
  //DD1 DD SUBSYS=(AOP1,'myprinter')
  ```

### Specifying transform options

You can use transform options to tell the transforms how you want the data to be transformed to AFP. You can use these methods to specify transform options:

**Transform configuration file**

The administrator can specify some transform options in the transform configuration file `aopxfd.conf`. For example, you can tell the PCL to AFP transform the resolution of the printer in the AOP_RESOLUTION environment variable in the transform configuration file.

The administrator can create separate classes of a transform with different transform options in each class. For example, the administrator could create a transform class for AFP printers with a resolution of 300 pels, and a class for printers with a resolution of 600 pels. The administrator names and defines the transform classes in the transform configuration file. To use a transform class that the administrator has defined:

- The administrator can specify the name of the transform class in the `-c` transform option in the printer definition.
- The job submitter can specify the name of the transform class in the `-c` transform command option.

**Transform command options**

You can specify some transform options on the transform commands. For example, when you enter the `pdf2afp` command, you can specify option `-c transformclass` to tell the transform the name of a transform class to use.

When you transform and print documents, you can specify transform command options in the `filter-options` job attribute. For example, when you enter the `lp` command, you can specify the `-c` option in the `filter-options` job attribute.

### Software requirements

To use the transforms to AFP, this IBM software is required:

- z/OS V1R7 or higher
- PCL to AFP transform:
  - PTF for APAR OA24261
- PDF to AFP transform:
  - APAR OA16615/PTF UA27523
  - APAR OA17998/PTF UA29461
Performance considerations

Transforming documents from the document format in which they were created to another document format uses more system resources than printing the documents on printers that support the original document format.

The impact on system and network resources varies depending on items such as:
- Print volume
- Content of documents being transformed
- Current utilization of the system and network resources

The throughput of the transform varies depending on items such as:
- Document format created
- Size, density, and complexity of the documents to be transformed
- Resolution of the output documents

In addition, transformed documents are usually larger than the original documents.

PCL to AFP transform

The PCL to AFP transform converts documents in Printer Control Language (PCL) 6 (XL, 5, 5e, 5c) format to AFP format. The transform can accept PCL documents in color. However, it always creates a monochrome AFP image.

The transform creates an AFP Image Object Content Architecture (IOCA) image for each page in the PCL document. The image can be a compressed IOCA image (recommended for faster printing) or an uncompressed image. The transform can produce a printable AFP document, or an AFP overlay or page segment that you can print as part of other documents.

You can specify the type of IOCA image and type of document the transform creates in options on the transform command and in options in the printer definition.
The administrator can specify the height and width of the output page and the resolution of the IOCA image in environment variables in the transform configuration file.

**Supported fonts**

The PCL to AFP transform contains a set of single-byte built-in fonts, which it uses to create a rasterized image of the data. For a list of the fonts that are built in, see Table 15 on page 111. DBCS fonts are not built in to the transform, but the transform can process DBCS fonts that are embedded in the PCL document.

If a PCL document specifies a font that is not built in and is not embedded in the PCL document, the transform substitutes another font that is the best match for the specified font. You cannot customize the way the transform performs font substitution, and the transform does not write any message when it substitutes fonts.

The administrator cannot add fonts to the transform. However, you can embed fonts in the PCL document.

**PCL to AFP transform limitations**

These limitations apply to the PCL to AFP transform:

- The transform does not produce color output. It produces monochrome output only.
- DBCS fonts are not built in to the transform, but the transform can process DBCS fonts that are embedded in the PCL document.
- The transform cannot create FS45 image objects, which some color printers require.
- PCL data can contain device commands (for example, to begin or end duplexing or to change the input bin). Because the AFP architecture defines those device functions in an AFP form definition, the transform ignores the device commands in the PCL data stream. To obtain these device functions, you must specify them in the form definition or Infoprint Server job attributes.
- Resolution conversion algorithms might produce a degraded appearance when used to reduce the resolution of a data stream. For this reason, the transform might degrade the appearance of higher-resolution data streams when used with 240-pel printers. You should verify that print fidelity is satisfactory.
- Subtle differences exist between PCL4 and PCL5e related to handling fonts. While many PCL4 files work with the transform, some might not produce the expected output.

**PDF to AFP transform**

The PDF to AFP transform converts documents in PDF 1.6 or lower levels of PDF format to AFP format. The transform can accept PDF documents in color. However, it always creates a monochrome AFP image.

The transform creates an AFP Image Object Content Architecture (IOCA) image for each page in the PDF document. The image can be a compressed IOCA image (recommended for faster printing) or an uncompressed image. The transform can produce a printable AFP document, or an AFP overlay or page segment that you can print as part of other documents.
You can specify the type and resolution of the IOCA image, the height and width of the output page, and the type of document the transform creates in options on the transform command and in options in the printer definition.

**Supported fonts**

The PDF to AFP transform provides a set of fonts, which it uses to create a rasterized image of the data. For a list of the fonts that are provided with the transform, see [Table 16 on page 111](#).

If a PDF document specifies a font that is not embedded in the PDF document and is not provided with the transform, the transform substitutes another font that is the best match for the specified font. You cannot customize the way the transform performs font substitution.

The administrator can add single-byte ASCII fonts to the transform. For information, see "Adding fonts" on page 60.

The transform writes a message when it substitutes fonts in a document. The transform writes the font-substitution message to the transform’s stderr file so that the administrator can see which fonts the transform has substituted.

**PDF to AFP transform limitations**

These limitations apply to the PDF to AFP transform:

- The transform does not produce color output. It produces monochrome output only.
- The transform cannot process DBCS fonts.
- The PDF to AFP transform might not be able to transform very large PDF documents that contain non-balanced page trees. For information about page trees, see the Adobe PDF Reference, which is available on the Adobe Web site (www.adobe.com).
  
  **Tip:** Applications that create PDF documents by combining a large number of separate PDF documents sometimes create PDF documents with non-balanced tree structures.
- Resolution conversion algorithms might produce a degraded appearance when used to reduce the resolution of images imbedded in a data stream. For this reason, the transform might degrade the appearance of higher-resolution images when used with 240-pel printers. You should verify that print fidelity is satisfactory.
- This transform cannot create AFP FS45 image objects, which some color printers require. However, the PDF to AFP transform that InfoPrint® Manager for AIX and Windows provides can create FS45 images. If your installation has installed InfoPrint Manager for AIX or Windows, the administrator can set up the printer definitions for the color printers to run the transform remotely using InfoPrint Manager. For information, see "Transforming data remotely with InfoPrint Manager for AIX or Windows" in [z/OS Infoprint Server Operation and Administration](#).
- The transform cannot transform PDF files that are concatenated. If you use the AOPBATCH program to run the transform, you must transform each PDF file in a separate step.
The PostScript to AFP transform converts documents in PostScript Language Level 3 format to AFP format. The transform can accept PostScript documents in color. However, it always creates a monochrome AFP image.

The transform creates an AFP Image Object Content Architecture (IOCA) image for each page in the PostScript document. The image can be a compressed IOCA image (recommended for faster printing) or an uncompressed image. The transform can produce a printable AFP document, or an AFP overlay or page segment that you can print as part of other documents.

You can specify the type, height, width, and resolution of the IOCA image, and the type of document the transform creates in options on the transform command and in options in the printer definition.

**Supported fonts**

The PostScript to AFP transform provides a set of fonts, which it uses to create a rasterized image of the data. For a list of the fonts that are provided with the transform, see [Table 16 on page 111](#).

If a PostScript document specifies a font that is not embedded in the PostScript document and is not provided with the transform, the transform substitutes another font that is the best match for the specified font. You cannot customize the way the transform performs font substitution.

The administrator can add single-byte ASCII fonts to the transform. For information, see "Adding fonts" on page 60.

The transform writes a message when it substitutes fonts in a document. The transform writes the font-substitution message to the transform’s stderr file so that the administrator can see which fonts the transform has substituted.

**PostScript to AFP transform limitations**

These limitations apply to the PostScript to AFP transform:

- The transform does not produce color output. It produces monochrome output only.
- The transform cannot process DBCS fonts.
- PostScript data can contain device commands (for example, to begin or end duplexing or to change the input bin). Because the AFP architecture defines those device functions in a form definition resource, the transform command ignores the device commands in the print data. To access those device functions, you must specify them in the form definition or attributes file, or on a print command, when you print the job.
- Resolution conversion algorithms might produce a degraded appearance when used to reduce the resolution of images imbedded in a data stream. For this reason, the transform might degrade the appearance of higher-resolution images when used with 240-pel printers. You should verify that print fidelity is satisfactory.
- This transform cannot create AFP FS45 image objects, which some color printers require. However, the PostScript to AFP transform that InfoPrint Manager for AIX and Windows provides can create FS45 images. If your installation has installed InfoPrint Manager for AIX or Windows, the administrator can set up the printer definitions for the color printers to run the transform remotely using InfoPrint Manager.
Manager. For information about how to set up printer definitions to run transform remotely, see [z/OS Infoprint Server Operation and Administration]

- The transform cannot transform PostScript files that are concatenated. If you use the AOPBATCH program to run the transform, you must transform each PostScript file in a separate step.

**SAP to AFP transform**

The SAP to AFP transform converts SAP R/3 Release 4.6C Output Text Format (OTF) and Advanced Business Application Programming (ABAP) documents to AFP format:

- SAP R/3 OTF data streams are converted into AFP Presentation Text Object Content Architecture (PTOCA) data streams.
- SAP R/3 ABAP data streams are converted into line data.

The transform selects the appropriate AFP resources (form definition, page definition, and font) to use when PSF prints the document. The transform selects the resources based on the value of the PJFORM keyword in the header of the SAP data stream.

The administrator can customize these transform configuration files:

- **barcode.tab**
  Maps SAP OTF bar code names to the bar codes in Bar Code Object Content Architecture™ (BCOCA™).

- **defcp.tab**
  Maps the Open Systems EBCDIC 1047 code page to the code page associated with the ABAP coded fonts specified in `pagedef.tab`.

- **fonts.tab**
  Maps the fonts used in the OTF data stream to AFP fonts.

- **image.tab**
  Defines values used to print image data.

- **pagedef.tab**
  For each SAP R/3 Format name, specifies the page definition, form definition, ABAP coded fonts.

- **xxxx0000.tab**
  Maps an SAP code page to an AFP code page.

For information about how to customize these files, see [Customizing SAP to AFP configuration files] on page 63.

**Supported input code pages**

The SAP to AFP transform supports these input code pages:

- 0000 EBCDIC ISO-1 (Latin 1)
- 0120 EBCDIC ISO-1 (Latin 1)
- 1100 ASCII ISO 8859/1 (Latin 1)
- 4001 OCR-A (ASCII)
- 4004 OCR-B (ASCII)
- 8000 Japanese ISO Shift-JIS

For information about the 4-byte codes (such as 0120, 1100), see the SAP R/3 4.6C specifications.
**SAP to AFP transform limitations**

These limitations apply to the SAP to AFP transform:

- The transform does not produce color output. It produces monochrome output only.
- The transform cannot create FS45 image objects, which some color printers require.
Chapter 2. Using transforms

This chapter describes the z/OS UNIX transform commands that you can use. It also describes how to use the Infoprint Server subsystem and the lprafp command to transform and print documents.

The transform commands let you convert files to an AFP data stream without printing. The transform commands can write the output AFP data stream to a UNIX file or to an MVS data set.

For the levels of the data stream files that the transform commands transform, see "Transform names and levels" on page 1.

The sections in this chapter are:

- pcl2afp—Transform PCL data to AFP data on page 13
- pdf2afp—Transform PDF data to AFP data on page 17
- ps2afp—Transform PostScript data to AFP data on page 24
- sap2afp—Transform SAP OTF or ABAP data to AFP data on page 32
- “Transforming data with the AOPBATCH program” on page 35
- “Using the Print Interface subsystem” on page 40
- “Using the lprafp command” on page 40
- “Calculating the size of the AFP data stream” on page 41

pcl2afp—Transform PCL data to AFP data

Format

```
pcl2afp [-a imagetype] [-c transformclass] [-o outputfile]
[-p pagerange] [-t outputtype] [-T] [inputfile ...]
```

Description

The `pcl2afp` command converts a Printer Control Language (PCL) data file into an Advanced Function Presentation (AFP) data stream file.

If you specify the same option multiple times, the command uses only the last option.

You can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify a dash (-) as the file name, `pcl2afp` uses standard input. The output file name is also optional. If you do not specify one, the `pcl2afp` command writes the results to standard output.

Options

- `-a imagetype`
  Determines the type of AFP data stream image to generate for each page in the PCL file.
  Values are:
  - `io1-g4` Compressed Image Object Content Architecture (IOCA) image in Modified Telecommunication Standardization Sector (TSS) T.6 G4
Facsimile Coding Scheme (G4 MMR) format. This is the recommended output type because the AFP output data stream is smaller and it prints faster.

**Tips:**
1. Some older AFP printers do not support printing with an image type of `io1-g4`. For these printers, specify an image type of `io1-mmr` because it is the compressed image type that they support. This image type results in faster printing than uncompressed image types.
2. TSS was formerly the International Telegraph and Telephone Consultative Committee (CCITT).

- **im1** IM1 image. This type of image is not compressed. Specify it only if you know that your printer does not support compressed images.

**Note:** Do not create IM1 images at a resolution that the printer does not support because Print Services Facility (PSF) converts the IM1 images to uncompressed IOCA images at the resolution the printer requires. This conversion can cause PSF to use very large amounts of CPU time.

- **io1** IOCA image. This type of image is not compressed. Specify it only if you know that your printer does not support compressed images.

- **io1-mmr** Compressed IOCA image in Modified Modified Read (MMR) format.

- **-c transformclass**
  Specifies the name of a transform class that your administrator has defined. The transform class determines these options:
  - The length and width of the generated image
  - The page margins
  - The resolution of the output image
  - The amount of memory that the transform allocates

  Ask your administrator for the name of a transform class suitable for the printer and the type of job.

**Tip:** If the transform class specifies a resolution that the printer does not support, PSF prints the image under most conditions, but with degraded results.

- **-o outputfile**
  Specifies the output path and file into which the transform output (that is, AFP data) is written. The transform overwrites any existing data in the output file. If you specify more than one output file, the last path and file name are used. If you do not specify an output file, the result is written to standard output (STDOUT).

To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with `/`. When you specify a fully qualified name, two sets of quotation marks are required. For example, `"//hlq.PDS(MYDOC)"` or `"//hlq.SEQDS"`. When you specify a partially qualified name, you only need one set of quotation marks. For example, `"//PDS(MYDOC)"` or `"//SEQDS"`. 
If you specify an MVS data set, you must allocate and catalog the data set before you run this command. Allocate the output data set with these characteristics:

- Record format: VBM
- Record length: 8K (8192) bytes or larger

Allocate an MVS data set that is large enough to hold the AFP data stream. The size of the AFP data stream depends on the size and complexity of the document, the type of image compression you select in the -a option, and the resolution the administrator specifies in the AOP_RESOLUTION environment variable. Typically, an output AFP data stream is several times as large as the input data stream. For information about the size of the AFP data stream, see "Calculating the size of the AFP data stream" on page 41.

**Note:** If the specified MVS output data set does not exist, the transform creates the data set; however, the data set does not have the correct record format and record length. If you attempt to print the data set, PSF for z/OS writes message APS114I.

**-p pagerange**

Specifies that the output should contain only selected pages.

The `-p` option counts pages by their actual sequence in the document, not by page number. For example, to write only the last page of a document whose pages are numbered i, ii, 1, 2, 3, 4, specify `-p 6`.

Examples of values include:

- `-p 1-10` Write the first through tenth pages.
- `-p 10-` Write pages from the tenth page until the end of the file.

**-t outputtype**

Determines the type of output to create.

Values are:

- **document**
  
  Printable document.

- **overlay**
  
  Graphic image that can be printed on each page of a printable document.

- **pagesegment**
  
  Graphic image that can be embedded in a printable document.

**Tip:** When you create overlays or page segments from multiple-page documents, use the `-p` option to select a single page. If you do not select a page, the output will contain an overlay or page segment only for the first page because the AFP architecture does not allow multiple, concatenated overlays or page segments.

**-T** Requests a trace. Specify this option only if instructed by IBM service personnel. For more information, see Chapter 5, “Diagnosing errors,” on page 87.

**Tip:** You can use the `filter-options` job attribute with, for example, the `lp` command to pass any of these options except `-o outputfile` to the transform. For information about the `filter-options` job attribute, see the z/OS Infoprint Server User's Guide.
Operand

\textit{inputfile}

Specifies an input file to be transformed. If you specify more than one input
file name, the \texttt{pcl2afp} command transforms each file to AFP format and
writes the results to a single output file (if one is specified) or to standard
output.

If you do not specify an input file, or if you specify a dash (-) as the file
name, \texttt{pcl2afp} uses standard input.

Examples -- \texttt{pcl2afp}

\textbf{Transform a file, specifying transform class}

To transform the PCL file \texttt{myfile.pcl} into an AFP data stream, using the \texttt{a4_300}
transform class, and write the result to a file called \texttt{myfile.afp}, enter:

\begin{verbatim}
pcl2afp -c a4_300 -o myfile.afp myfile.pcl
\end{verbatim}

\textbf{Transform and print a file, specifying image type}

To transform the PCL file \texttt{myfile.pcl} into an AFP data stream as an IO1-MMR
image, and send the result to the default printer with the \texttt{lp} command, enter:

\begin{verbatim}
pcl2afp -a io1-mmr myfile.pcl | lp
\end{verbatim}

\textbf{Transform a file using redirection}

To transform the PCL file \texttt{input.pcl} into the AFP output file called \texttt{output.afp},
enter:

\begin{verbatim}
pcl2afp < input.pcl > output.afp
\end{verbatim}

\textbf{Note:} You can use redirection operators only with UNIX files.

\textbf{Transform multiple files}

To transform the PCL files \texttt{input.01.pcl}, \texttt{input.02.pcl}, ... \texttt{input.xx.pcl}
and write the results to one AFP output file called \texttt{output.afp}, enter:

\begin{verbatim}
pcl2afp -o output.afp input.01.pcl input.02.pcl ... input.xx.pcl
\end{verbatim}

\textbf{Transform a UNIX file to an MVS data set}

To transform file \texttt{input.pcl} into an existing, cataloged MVS output data set called
\texttt{hlq.OUTPUT.AFP(member)}, where \texttt{hlq} is your user ID, enter:

\begin{verbatim}
pcl2afp -o "/hlq.OUTPUT.AFP(member)" input.pcl
\end{verbatim}

\textbf{Transform an MVS data set, writing the output to a UNIX file}

To transform the MVS data set \texttt{hlq.INPUT.PCL(member)}, where \texttt{hlq} is your user ID,
into an output file called \texttt{output.afp}, enter:

\begin{verbatim}
pcl2afp -o output.afp "/hlq.INPUT.PCL(member)"
\end{verbatim}

Environment variables

The \texttt{pcl2afp} command uses these environment variables:

- \texttt{AOPCONF} Names the Infoprint Server configuration file. This variable takes
  precedence over the user-specific configuration file
  \texttt{($HOME/.aopconf)} and the system default configuration file
  \texttt{(/etc/Printsrv/aopd.conf)}. For more information about the
  configuration file, see \url{z/OS Infoprint Server Customization}.

- \texttt{LIBPATH} The path used to locate dynamic link libraries (DLLs).
NLSPATH

Names the directory paths that the **pcl2afp** command searches for message catalogs.

For information about setting and using environment variables, see [z/OS UNIX System Services User’s Guide](#).

**Files**

$HOME/.aopconf

Contains the user-specific Infoprint Server configuration file. This file takes precedence over `/etc/Printsrv/aopd.conf`.

`/etc/Printsrv/aopd.conf`

Contains the system default Infoprint Server configuration file.

For the format of the configuration files, see [z/OS Infoprint Server Customization](#).

**Exit values**

- **0** The data was transformed successfully. However, the output document might contain error messages related to errors in the input data stream.
- **>0** An error occurred. No output document was created.

**pdf2afp—Transform PDF data to AFP data**

**Format**

```bash
pdf2afp [-a imagetype] [-c transformclass] [-l length] [-o outputfile]
        [-p pagerange] [-r resolution] [-t outputtype] [-w width]
        [-x xmargin] [-y ymargin] [-T] [inputfile...]
```

**Description**

The **pdf2afp** command converts a Portable Document Format (PDF) data file into an Advanced Function Presentation (AFP) data stream file.

If you specify the same option multiple times, the command uses only the last option.

You can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify a dash (`-`) as the file name, **pdf2afp** uses standard input. The output file name is also optional. If you do not specify one, the **pdf2afp** command writes the results to standard output.

**Options**

- **-a imagetype**
  Determines the type of AFP data stream image to generate for each page in the PDF file.
  Values are:
  - **io1-g4** Compressed Image Object Content Architecture (IOCA) image in Modified Telecommunication Standardization Sector (TSS) T.6 G4
Facsimile Coding Scheme (G4 MMR) format. This is the recommended output type because the AFP output data stream is smaller and it prints faster.

**Tips:**

1. Some older AFP printers do not support printing with an image type of `io1-g4`. For these printers, specify an image type of `io1-mmr` because it is the compressed image type that they support. This image type results in faster printing than uncompressed image types.

2. TSS was formerly the International Telegraph and Telephone Consultative Committee (CCITT).

```plaintext
im1
IM1 image. This type of image is not compressed. Specify it only if you know that your printer does not support compressed images.
```

**Note:** Do not create IM1 images at a resolution that the printer does not support because Print Services Facility (PSF) converts the IM1 images to uncompressed IOCA images at the resolution the printer requires. This conversion can cause PSF to use very large amounts of CPU time.

```plaintext
io1
IOCA image. This type of image is not compressed. Specify it only if you know that your printer does not support compressed images.
```

```plaintext
io1-mmr
Compressed IOCA image in Modified Modified Read (MMR) format.
```

```plaintext
-c transformclass
Specifies the name of a transform class that the administrator has defined. The transform class determines these options:
- The initial transform configuration
- The fonts used in the transformed files

Ask the administrator for the name of a transform class suitable for the type of job.
```

```plaintext
-l length
Specifies the length of the generated image. In general, specify the length of the physical page. For more information about this option, see “Usage notes” on page 23. Specify a number followed by one of these units:

<table>
<thead>
<tr>
<th>Unit</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>in</td>
<td>Inches</td>
</tr>
<tr>
<td>mm</td>
<td>Millimeters</td>
</tr>
<tr>
<td>pel</td>
<td>Pels, the default unit</td>
</tr>
</tbody>
</table>

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:

- `11in` 11 inches, the default for all printers
- `0.1334in` to `53in` Inch values for 240-pel printers
- `0.1067in` to `53in` Inch values for 300-pel printers
- `0.0667in` to `53in` Inch values for 480-pel printers
- `0.0534in` to `53in` Inch values for 600-pel printers
3.3867mm to 1346.2mm  Millimeter values for 240-pel printers
2.7094mm to 1346.2mm  Millimeter values for 300-pel printers
1.6934mm to 1346.2mm  Millimeter values for 480-pel printers
1.3547mm to 1346.2mm  Millimeter values for 600-pel printers
32pel to 12720pel     Pel values for 240-pel printers
32pel to 15900pel     Pel values for 300-pel printers
32pel to 25440pel     Pel values for 480-pel printers
32pel to 31800pel     Pel values for 600-pel printers

Examples of values include:
-1 40mm
-1 200.5mm
-1 13in
-1 5280
-1 5280pel

Tip: If a text margin is already built into the file, try -l 11in to set the length to 11 inches.

-o outputfile
Specifies the output path and file into which the transform output (that is, AFP data) is written. The transform overwrites any existing data in the output file. If you specify more than one output file, the last path and file name are used. If you do not specify an output file, the result is written to standard output (STDOUT).

To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with // When you specify a fully qualified name, two sets of quotation marks are required. For example, "//hlq.PDS(MYDOC)" or "//hlq.SEQDS". When you specify a partially qualified name, you only need one set of quotation marks. For example, "//PDS(MYDOC)" or "//SEQDS".

If you specify an MVS data set, you must allocate and catalog the data set before you run this command. Allocate the output data set with these characteristics:
- Record format: VBM
- Record length: 8K (8192) bytes or larger

Allocate an MVS data set that is large enough to hold the AFP data stream. The size of the AFP data stream depends on the size and complexity of the document, the type of image compression (-a option), and the resolution of the image (-r option). Typically, an output AFP data stream is several times as large as the input data stream. For information about the size of the AFP data stream, see "Calculating the size of the AFP data stream" on page 41.

Note: If the specified MVS output data set does not exist, the transform creates the data set; however, the data set does not have the correct record format and record length. If you attempt to print the data set, PSF for z/OS writes message APS114I.

-p pagerange
Specifies that the output should contain only selected pages.
Examples of values include:
-p 1-10       Write the first through tenth pages.
-p 10- Write pages from the tenth page until the end of the job.

-r resolution
Specifies the resolution of the output image. Select the correct resolution for the printer on which you intend to print the image.
Values are:
240 240 pels per inch (for example, IBM 3812, 3825, 3827, 3835, and 3900 printers)
300 300 pels per inch (for example, IBM 4019, 4028, 4029, and 4039 printers and some Hewlett-Packard printers)
480 480 pels per inch
600 600 pels per inch (for example, InfoPrint 60 and InfoPrint 4000 printers), the default

Tips:
1. If you specify a resolution that the printer does not support, PSF prints the image under most conditions, but sometimes with degraded results.
2. A resolution of 300 pels typically produces good quality output on 300 or 600 pel printers. 300 pel output requires one-fourth the space and transmission time.

-t outputtype
Determines the type of output to create.
Values are:
document Printable document.
overlay Graphic image that can be printed on each page of a printable document.
pagesegment Graphic image that can be embedded in a printable document.

Tip: When you create an overlay or page segment from a multiple-page input file, use the -p option to select a single page. If you do not select a page, the output will contain multiple, concatenated overlays or page segments. The AFP architecture does not allow multiple, concatenated overlays or page segments.

-w width
Specifies the maximum width of the generated image. In general, specify the width of the physical page. For more information about this option, see "Usage notes" on page 23. Specify a number followed by one of these units:
in Inches
mm Millimeters
pel Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.
Values are:
8.5in  8.5 inches, the default for all printers
0.1334in to 25.5in  Inch values for 240-pel printers
0.1067in to 25.5in  Inch values for 300-pel printers
0.0667in to 25.5in  Inch values for 480-pel printers
0.0534in to 25.5in  Inch values for 600-pel printers
3.3867mm to 647.7mm  Millimeter values for 240-pel printers
2.7094mm to 647.7mm  Millimeter values for 300-pel printers
1.6934mm to 647.7mm  Millimeter values for 480-pel printers
1.3547mm to 647.7mm  Millimeter values for 600-pel printers
32pel to 6120pel  Pel values for 240-pel printers
32pel to 7650pel  Pel values for 300-pel printers
32pel to 12240pel  Pel values for 480-pel printers
32pel to 15300pel  Pel values for 600-pel printers

Examples of values include:
-w 40mm
-w 200.5mm
-w 13in
-w 4000
-w 4000pel

Tip: If a text margin is already built into the file, try -w 8.5in to set the width to 8.5 inches.

-x xmargin
Specifies a horizontal margin or border around the generated image to avoid the non-printable areas of some printers. For more information about this option, see Usage notes on page 23. Specify a number followed by one of these units:

in  Inches
mm  Millimeters
pel  Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:
0  Zero, the default for all printers
0in to 12.75in  Inch values for all printers
0mm to 323.85mm  Millimeter values for all printers
0pel to 3060pel  Pel values for 240-pel printers
0pel to 3825pel  Pel values for 300-pel printers
0pel to 6120pel  Pel values for 480-pel printers
Tips:

1. Because the X value specifies margins on both the left and right sides of the page, the X value can be no more than half of the width (-w) of the generated image. For example, if you specify a width of 8 inches, the X value can be no larger than 4 inches. If you specify an X value of 5 inches, a blank page is printed because the sum of the left and right margins exceeds the width of the paper.

2. The X value does not shift the image on the page. The image is cropped if it is defined to print in the left or right margin.

-y ymargin

Specifies a vertical margin or border around the generated image to avoid the non-printable areas of some printers. For more information about this option, see “Usage notes” on page 23. Specify a number followed by one of these units:

- in Inches
- mm Millimeters
- pel Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:

- 0 Zero, the default for all printers
- 0in to 26.5in Inch values for all printers
- 0mm to 673.1mm Millimeter values for all printers
- 0pel to 6360pel Pel values for 240-pel printers
- 0pel to 7950pel Pel values for 300-pel printers
- 0pel to 12720pel Pel values for 480-pel printers
- 0pel to 15900pel Pel values for 600-pel printers

Tips:

1. Because the Y value specifies margins on both the top and bottom of the page, the Y value can be no more than half of the length (-l) of the generated image. For example, if you specify a length of 12 inches, the Y value can be no larger than 6 inches. If you specify a Y value of 7 inches, a blank page is printed because the sum of the top and bottom margins exceeds the length of the paper.

2. The Y value does not shift the image on the page. The image is cropped if it is defined to print in the top or bottom margin.

-T Requests a trace. Specify this option only if instructed by IBM service personnel. For more information, see Chapter 5, “Diagnosing errors,” on page 87.
Tip: You can use the filter-options job attribute with, for example, the lp command to pass any of these options except -o outputfile to the transform. For information about the filter-options job attribute, see "z/OS Infoprint Server User’s Guide."

Operand

inputfile

Specifies an input file to be transformed. If you specify more than one input file name, the pdf2afp command transforms each file to AFP format and writes the results to a single output file (if one is specified) or to standard output.

If you do not specify an input file, or if you specify a dash (-) as the file name, pdf2afp uses standard input.

Usage notes

In general, to position data on the page:

- Use -l and -w to set the physical page dimensions.
- Use -x and -y to set the amount of white space between the physical page dimensions and the image.

These options do not shift or scale the image on the page. If the image is defined to print in the unprintable areas, it is cropped.

For example, to create a 6.5 x 9 inch image that is centered on an 8.5 x 11 inch page, enter:

```
-l 11in -w 8.5in -x 1in -y 1in
```

- Use a form definition that specifies zero vertical offset and zero horizontal offset, or specify X and Y offsets of 0 when you submit the print job.

Examples -- pdf2afp

Transform and print a file, specifying image type

To transform the PDF myfile1.pdf file into an AFP data stream as an IO1-MMR image, and send the result to the default printer with the lp command, enter:

```
pdf2afp -a io1-mmr myfile1.pdf | lp
```

Transform and print a file, specifying resolution

To transform the PDF file myfile1.pdf into an AFP data stream, and then submit it to the 4019 printer called robin, enter:

```
pdf2afp -r 300 myfile1.pdf | lp -d robin
```

Tip: You need to specify a resolution of 300 pels (-r 300) because the 4019 is a 300-pel resolution printer. The default resolution for the pdf2afp command is 600 pels.

Transform and print a file, specifying image type and resolution

To transform the PDF myfile1.pdf file into an AFP data stream in 300-pel resolution, as an IO1-MMR image, and send the result to the default printer with the lp command, enter:

```
pdf2afp -a io1-mmr -r 300 myfile1.pdf | lp
```

Transform a UNIX file to an MVS data set

To transform file input.pdf into an existing, cataloged MVS output data set called hlq.OUTPUT.AFP(member), where hlq is your user ID, enter:
Environment variables

The `pdf2afp` command uses these environment variables:

- **AOPCONF**: Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file (`$HOME/.aopconf`) and the system default configuration file (`/etc/Printsrv/aopd.conf`). For more information about the configuration file, see [z/OS Infoprint Server Customization](z/OS Infoprint Server Customization).

- **LIBPATH**: The path used to locate dynamic link libraries (DLLs).

- **NLSPATH**: Names the directory paths that the `pdf2afp` command searches for message catalogs.

For information about setting and using environment variables, see [z/OS UNIX System Services User's Guide](z/OS UNIX System Services User's Guide).

Files

- **$HOME/.aopconf**: Contains the user-specific Infoprint Server configuration file. This file takes precedence over `/etc/Printsrv/aopd.conf`.

- **/etc/Printsrv/aopd.conf**: Contains the system default Infoprint Server configuration file.

For the format of the configuration files, see [z/OS Infoprint Server Customization](z/OS Infoprint Server Customization).

Exit values

- **0**: The data was transformed successfully. However, the output document might contain error messages related to errors in the input data stream.

- **>0**: An error occurred. No output document was created.

---

**ps2afp—Transform PostScript data to AFP data**

**Format**

```
ps2afp [-a imagetype] [-c transformclass] [-I initializationfile] ... [-I length]

[-o outputfile] [-r resolution] [-t outputtype] [-w width]

[-x xmargin] [-y ymargin] [-T] [inputfile...]
```

**Description**

The `ps2afp` command converts a PostScript data file into an Advanced Function Presentation (AFP) data stream file.

If you specify the same option multiple times, the command uses only the last option, with the exception of the `-i` option. You can specify the `-i` option multiple times.

You can specify one or more input files to be transformed. If you do not specify an input file name, or if you specify a dash (`-`) as the file name, `ps2afp` uses standard
input. The output file name is also optional. If you do not specify one, the `ps2afp` command writes the results to standard output.

**Options**

- **-a imagetype**
  Determines the type of AFP data stream image to generate for each page in the PostScript file.
  Values are:
  - **io1-g4** Compressed Image Object Content Architecture (IOCA) image in Modified Telecommunication Standardization Sector (TSS) T.6 G4 Facsimile Coding Scheme (G4 MMR) format. This is the recommended output type because the AFP output data stream is smaller and it prints faster.
  - **io1-mmr** Compressed IOCA image in Modified Modified Read (MMR) format.
  - **im1** IM1 image. This type of image is not compressed. Specify it only if you know that your printer does not support compressed images.
  - **io1** IOCA image. This type of image is not compressed. Specify it only if you know that your printer does not support compressed images.

**Tips:**
1. Some older AFP printers do not support printing with an image type of `io1-g4`. For these printers, specify an image type of `io1-mmr` because it is the compressed image type that they support. This image type results in faster printing than uncompressed image types.
2. TSS was formerly the International Telegraph and Telephone Consultative Committee (CCITT).

**Note:** Do not create IM1 images at a resolution that the printer does not support because Print Services Facility (PSF) converts the IM1 images to uncompressed IOCA images at the resolution the printer requires. This conversion can cause PSF to use very large amounts of CPU time.

- **-c transformclass**
  Specifies the name of a transform class that your administrator has defined. The transform class determines these options:
  - The initial transform configuration
  - The fonts used in the transformed files
  Ask your administrator for the name of a transform class suitable for the type of job.

- **-i initializationfile**
  Specifies an ASCII PostScript file that is added to the start of the job to set up and initialize the PostScript transform. If you specify the `-i` option multiple times, the initialization files are processed in the order that you specify them.

- **-l length**
  Specifies the length of the generated image. In general, specify the length of the physical page. For more information about this option, see **Usage notes** on page 30. Specify a number followed by one of these units:
in    Inches
mm    Millimeters
pel   Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:

11in      11 inches, the default for all printers
0.1334in to 53in Inch values for 240-pel printers
0.1067in to 53in Inch values for 300-pel printers
0.0667in to 53in Inch values for 480-pel printers
0.0534in to 53in Inch values for 600-pel printers
3.3867mm to 1346.2mm Millimeter values for 240-pel printers
2.7094mm to 1346.2mm Millimeter values for 300-pel printers
1.6934mm to 1346.2mm Millimeter values for 480-pel printers
1.3547mm to 1346.2mm Millimeter values for 600-pel printers
32pel to 12720pel Pel values for 240-pel printers
32pel to 15900pel Pel values for 300-pel printers
32pel to 25440pel Pel values for 480-pel printers
32pel to 31800pel Pel values for 600-pel printers

Examples of values include:

-1 40mm
-1 290.5mm
-1 13in
-1 5280
-1 5280pel

Tip: If a text margin is already built into the file, try -l 11in to set the length to 11 inches.

-o outputfile

Specifies the output path and file into which the transform output (that is, AFP data) is written. The transform overwrites any existing data in the output file. If you specify more than one output file, the last path and file name are used. If you do not specify an output file, the result is written to standard output (STDOUT).

To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with // When you specify a fully qualified name, two sets of quotation marks are required. For example, "//hlq.PDS(MYDOC)" or "//hlq.SEQDS". When you specify a partially qualified name, you only need one set of quotation marks. For example, "//PDS(MYDOC)" or "//SEQDS".

If you specify an MVS data set, you must allocate and catalog the data set before you run this command. Allocate the output data set with these characteristics:
- Record format: VBM
- Record length: 8K (8192) bytes or larger
Allocate an MVS data set that is large enough to hold the AFP data stream. The size of the AFP data stream depends on the size and complexity of the document, the type of image compression (-a option), and the resolution of the image (-r option). Typically, an output AFP data stream is several times as large as the input data stream. For information about the size of the AFP data stream, see "Calculating the size of the AFP data stream" on page 41.

Note: If the specified MVS output data set does not exist, the transform creates the data set; however, the data set does not have the correct record format and record length. If you attempt to print the data set, PSF for z/OS writes message APS114I.

-r resolution
Specifies the resolution of the output image. Select the correct resolution for the printer on which you intend to print the image.

Values are:

240 240 pels per inch (for example, IBM 3812, 3825, 3827, 3835, and 3900 printers)
300 300 pels per inch (for example, IBM 4019, 4028, 4029, and 4039 printers and some Hewlett-Packard printers)
480 480 pels per inch
600 600 pels per inch (for example, InfoPrint 60 and InfoPrint 4000 printers), the default

Tips:
1. If you specify a resolution that the printer does not support, PSF prints the image under most conditions, but sometimes with degraded results.
2. A resolution of 300 pels typically produces good quality output on 300 or 600 pel printers. 300 pel output requires one-fourth the space and transmission time.

-t outputtype
Determines the type of output to create.

Values are:

document
Printable document.

overlay
Graphic image that can be printed on each page of a printable document.

pagesegment
Graphic image that can be embedded in a printable document.

Tip: When you create an overlay or page segment from a multiple-page input file, use the -p option to select a single page. If you do not select a page, the output will contain multiple, concatenated overlays or page segments. The AFP architecture does not allow multiple, concatenated overlays or page segments.

-w width
Specifies the maximum width of the generated image. In general, specify the width of the physical page. For more information about this option, see "Usage notes" on page 30. Specify a number followed by one of these units:
in    Inches
mm    Millimeters
pel   Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:

8.5in   8.5 inches, the default for all printers
0.1334in to 25.5in  Inch values for 240-pel printers
0.1067in to 25.5in  Inch values for 300-pel printers
0.0667in to 25.5in  Inch values for 480-pel printers
0.0534in to 25.5in  Inch values for 600-pel printers
3.3867mm to 647.7mm  Millimeter values for 240-pel printers
2.7094mm to 647.7mm  Millimeter values for 300-pel printers
1.6934mm to 647.7mm  Millimeter values for 480-pel printers
1.3547mm to 647.7mm  Millimeter values for 600-pel printers
32pel to 6120pel  Pel values for 240-pel printers
32pel to 7650pel  Pel values for 300-pel printers
32pel to 12240pel  Pel values for 480-pel printers
32pel to 15300pel  Pel values for 600-pel printers

Examples of values include:
- w 40mm
- w 290.5mm
- w 13in
- w 4000
- w 4000pel

Tip: If a text margin is already built into the file, try -w 8.5in to set the width to 8.5 inches.

-x xmargin
Specifies a horizontal margin or border around the generated image to avoid the non-printable areas of some printers. For more information about this option, see Usage notes on page 30. Specify a number followed by one of these units:

in    Inches
mm    Millimeters
pel   Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:

0       Zero, the default for all printers
0in to 12.75in  Inch values for all printers
Tips:
1. Because the X value specifies margins on both the left and right sides of the page, the X value can be no more than half of the width (-w) of the generated image. For example, if you specify a width of 8 inches, the X value can be no larger than 4 inches. If you specify an X value of 5 inches, a blank page is printed because the sum of the left and right margins exceeds the width of the paper.
2. The X value does not shift the image on the page. The image is cropped if it is defined to print in the left or right margin.

-y ymargin
Specifies a vertical margin or border around the generated image to avoid the non-printable areas of some printers. For more information about this option, see “Usage notes on page 30.” Specify a number followed by one of these units:
in Inches
mm Millimeters
pel Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Values are:
0 Zero, the default for all printers
0in to 26.5in Inch values for all printers
0mm to 673.1mm Millimeter values for all printers
0pel to 6360pel Pel values for 240-pel printers
0pel to 7950pel Pel values for 300-pel printers
0pel to 12720pel Pel values for 480-pel printers
0pel to 15900pel Pel values for 600-pel printers

Tips:
1. Because the Y value specifies margins on both the top and bottom of the page, the Y value can be no more than half of the length (-l) of the
generated image. For example, if you specify a length of 12 inches, the Y value can be no larger than 6 inches. If you specify a Y value of 7 inches, a blank page is printed because the sum of the top and bottom margins exceeds the length of the paper.

2. The Y value does not shift the image on the page. The image is cropped if it is defined to print in the top or bottom margin.

-T Requests a trace. Specify this option only if instructed by IBM service personnel. For more information, see Chapter 5, “Diagnosing errors,” on page 87.

Tip: You can use the filter-options job attribute with, for example, the \texttt{lp} command to pass any of these options except -o outputfile to the transform. For information about the filter-options job attribute, see \texttt{z/OS Infoprint Server User's Guide}.

**Operand**

\texttt{inputfile}

Specifies an input file to be transformed. If you specify more than one input file name, the ps2afp command transforms each file to AFP format and writes the results to a single output file (if one is specified) or to standard output.

If you do not specify an input file, or if you specify a dash (-) as the file name, ps2afp uses standard input.

**Usage notes**

In general, to position data on the page:

- Use -l and -w to set the physical page dimensions.
- Use -x and -y to set the amount of white space between the physical page dimensions and the image.

These options do not shift or scale the image on the page. If the image is defined to print in the unprintable areas, it is cropped.

For example, to create a 6.5 x 9 inch image that is centered on an 8.5 x 11 inch page, enter:

\texttt{-l 11in -w 8.5in -x 1in -y 1in}

- Use a form definition that specifies zero vertical offset and zero horizontal offset, or specify X and Y offsets of 0 when you submit the print job.

**Examples -- ps2afp**

**Transform a file, specifying transform class**

To transform the PostScript file \texttt{myfile.ps} into an AFP data stream, using the bigjob transform class, and write the result to a file called \texttt{myfile.afp}, enter:

\texttt{ps2afp -c bigjob -o myfile.afp myfile.ps}

**Transform a file, specifying image size**

To transform the PostScript file \texttt{myfile2.ps} into an AFP data stream, with an image that is 8 inches high and 5 inches wide, and write the result to a file called \texttt{myfile2.afp}, enter:

\texttt{ps2afp -l 8in -w 5in -o myfile2.afp myfile2.ps}
Transform a file, using redirection
To transform the PostScript file input.ps into the AFP output file called output.afp, enter:

ps2afp < input.ps > output.afp

Note: You can only use redirection operators with z/OS UNIX files.

Transform multiple files
To transform the PostScript files input.01.ps, input.02.ps, ... input.xx.ps and write the results to one AFP output file called output.afp, enter:

ps2afp -o output.afp input.01.ps input.02.ps ... input.xx.ps

Transform a UNIX file to an MVS data set
To transform file input.ps into an existing, cataloged MVS output data set called hlq.OUTPUT.AFP(member), where hlq is your user ID, enter:

ps2afp -o "//hlq.OUTPUT.AFP(member)" input.ps

Environment variables
The ps2afp command uses these environment variables:

**AOPCONF** Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file ($HOME/.aopconf) and the system default configuration file (/etc/Printsrv/aopd.conf). For more information about the configuration file, see [z/OS Infoprint Server Customization](https://www.ibm.com/downloads/z/0).

**LIBPATH** The path used to locate dynamic link libraries (DLLs).

**NLSPATH** Names the directory paths that the ps2afp command searches for message catalogs.


Files

$HOME/.aopconf
Contains the user-specific Infoprint Server configuration file. This file takes precedence over /etc/Printsrv/aopd.conf.

/etc/Printsrv/aopd.conf
Contains the system default Infoprint Server configuration file.

For the format of the configuration files, see [z/OS Infoprint Server Customization](https://www.ibm.com/downloads/z/0).

Exit values

0 The data was transformed successfully. However, the output document might contain error messages related to errors in the input data stream.

>0 An error occurred. No output document was created.
sap2afp—Transform SAP OTF or ABAP data to AFP data

Format

```
sap2afp [-st] [-o outputfile] [-p pagerange] ... [-r resolution]

[inputfile ...]
```

Description

The sap2afp command converts System Generic Output Format (SAPGOF) Output Text Format (OTF) and Advanced Business Application Programming (ABAP) data files:

- SAP OTF data files are converted into Advanced Function Presentation (AFP) Presentation Text Object Content Architecture (PTOCA) data streams.
- SAP ABAP data files are converted into line data streams.

If you specify the same option multiple times, the command uses only the last option, with the exception of the -p option. You can specify the -p option up to 20 times.

You can specify one or more input files to be transformed. If you specify more than one input file, the command concatenates the files, and the job attributes are determined by the first file transformed. If you do not specify an input file name, or if you specify a dash (-) as the file name, sap2afp uses standard input. The output file name is also optional. If you do not specify one, the sap2afp command writes the results to standard output.

Tip: The size of the transformed image and the position of SAP data on the page depend on the values that the administrator has defined.

Options

- `-o outputfile`
  Specifies the output path and file into which the transform output (that is, AFP or line data) is written. The transform overwrites any existing data in the output file. If you specify more than one output file, the last specified path and file name are used. If you do not specify an output file, the result is written to standard output (STDOUT).

  To specify an MVS data set, such as a sequential or partitioned data set, precede the data set name with `/`. When you specify a fully qualified name, two sets of quotation marks are required. For example, `"/hlq.PDS(MYDOC)"` or `"/hlq.SEQDS"`. When you specify a partially qualified name, you only need one set of quotation marks. For example, `"/PDS(MYDOC)"` or `"/SEQDS"`.

  If you specify an MVS data set, you must allocate and catalog the data set before you run this command. Allocate the output data set with these characteristics:
  - Record format: VBM
  - Record length: 8K (8192) bytes or larger

  Allocate an MVS data set that is large enough to hold the AFP data stream.
  Typically, the output AFP data stream is the same size as the input data stream.
Note: If the specified MVS output data set does not exist, the transform creates the data set; however, the data set does not have the correct record format and record length. If you attempt to print the data set, PSF for z/OS writes message APS114I.

-p pagerange
   Specifies that the output should contain only selected pages. If you specify the -p option multiple times, the pages are processed in the order you specify them. You can specify the -p option up to 20 times.

   The -p option counts pages by their actual sequence in the document, not by page number. For example, to write only the last page of a document whose pages are numbered i, ii, 1, 2, 3, 4, specify -p 6.

Examples of values include:
   -p even Write even pages.
   -p odd Write odd pages.
   -p 1-10 Write the first through tenth pages.
   -p 10- Write pages from the tenth page until the end of the job.
   -p 1, -p 3, -p 6 Write the first, third, and sixth pages.

-r resolution
   Specifies the resolution used to print image data in the job. Select the correct resolution for the printer on which you intend to print the job.

   Values are:
   240 240 pels per inch (for example, IBM 3812, 3825, 3827, 3835, and 3900 printers)
   300 300 pels per inch (for example, IBM 3112, 3116, 4019, 4028, 4029, and 4039 printers and Hewlett-Packard printers)
   480 480 pels per inch
   600 600 pels per inch (for example, the InfoPrint 60 and InfoPrint 4000 printers)

   The default resolution is the resolution defined by the administrator. If the resolution has not been set, the transform fails with error message AOP2009E.

Tips:
1. If you specify a resolution that the printer does not support, PSF prints the image under most conditions, but sometimes with degraded results.
2. A resolution of 300 pels typically produces good quality output on 300 or 600 pel printers. 300 pel output requires one-fourth the space and transmission time.

-s Suppresses Graphic Object Content Architecture (GOCA) boxes. Some older printers do not print these boxes.

-t Requests a trace. Specify this option only if instructed by IBM service personnel. For information about this option, see "Running traces" on page 88.
Tip: You can use the `filter-options` job attribute with, for example, the `lp` command to pass any of these options except `-o outputfile` to the transform. For information about the `filter-options` job attribute, see [z/OS Infoprint Server User's Guide](#).

### Operand

**inputfile**

Specifies an input file to be transformed. If you specify more than one input file name, the `sap2afp` command concatenates the files. The results are written to a single output file (if one is specified) or to standard output.

The data in the file must be in stream mode. That is, it must not contain any record data.

If you do not specify an input file, or if you specify a dash (`-`) as the file name, `sap2afp` uses standard input.

### Examples -- sap2afp

**Transform a file, specifying resolution**

To transform the SAP ABAP file `myfile.abap` for printing on a 600-pel AFP printer, and write the result to a file called `myfile.afp`, enter:

```
sap2afp -r 600 -o myfile.afp myfile.abap
```

**Transform and print a file**

To transform the SAP OTF file `myfile.otf` into an AFP data stream, and send the result to the default printer with the `lp` command, enter:

```
sap2afp myfile.otf | lp
```

**Transform a file using redirection**

To transform the SAP file `input.sap` into the AFP output file called `output.afp`, enter:

```
sap2afp < input.sap > output.afp
```

**Note:** You can use redirection operators only with UNIX files.

**Transform multiple files and concatenate the output**

To transform the SAP files `input.01.sap`, `input.02.sap`, ... `input.xx.sap` into one AFP output file called `output.afp`, enter:

```
sap2afp -o output.afp input.01.sap input.02.sap ... input.xx.sap
```

**Transform a UNIX file to an MVS data set**

To transform file `input.sap` into an existing, cataloged MVS output data set called `hlq.OUTPUT.AFP(member)`, where `hlq` is your user ID, enter:

```
sap2afp -o "//hlq.OUTPUT.AFP(member)" input.sap
```

**Transform an MVS data set, writing the output to a UNIX file**

To transform the MVS data set `hlq.INPUT.SAP(member)`, where `hlq` is your user ID, into an output file called `output.afp`, enter:

```
sap2afp -o output.afp "//hlq.INPUT.SAP(member)"
```

### Environment variables

The `sap2afp` command uses these environment variables:
AOP_SAP2AFP_RESOURCES
   Specifies the directory that contains all of the SAP to AFP transform resources. The default value is /usr/lpp/Printsrv/sap2afp.

AOPCONF
   Names the Infoprint Server configuration file. This variable takes precedence over the user-specific configuration file ($HOME/.aopconf) and the system default configuration file (/etc/Printsrv/aopd.conf). For more information about the configuration file, see [z/OS Infoprint Server Customization](#).

LIBPATH
   The path used to locate dynamic link libraries (DLLs).

NLSPATH
   Names the directory paths that the sap2afp command searches for message catalogs.

For information about setting and using environment variables, see [z/OS UNIX System Services User’s Guide](#).

Files

$HOME/.aopconf
   Contains the user-specific Infoprint Server configuration file. This file takes precedence over /etc/Printsrv/aopd.conf.

/etc/Printsrv/aopd.conf
   Contains the system default Infoprint Server configuration file.

barcode.tab, defcp.tab, fonts.tab, image.tab, pagedef.tab, xxxx0000.tab
   Customization files for the SAP to AFP transform.

Exit values

0   The data was transformed successfully. However, the output document might contain error messages related to errors in the input data stream.

>0  An error occurred. No output document was created.

Transforming data with the AOPBATCH program

This section describes how to use the Infoprint Server AOPBATCH program to run the transform commands. The AOPBATCH program lets you submit a batch job to transform data to AFP. Infoprint Server provides the AOPBATCH program in SYS1.LINKLIB.

AOPBATCH parameters

The AOPBATCH parameters are the name of the transform command, followed by transform options and arguments, in this format:

```
EXEC PGM=AOPBATCH,PARM='/transform_name transform_options'
```

The optional slash indicates that the PARM data that follows is input to AOPBATCH. If you omit the initial slash, your PARM data might be interpreted as C++ run-time options. You must include the initial slash if any of the PARM data itself includes a slash. For example, if the transform name is /mylib/ps2afp, specify: PARM="/mylib/ps2afp ...".

```
transform_name
   The name of an executable transform program that resides in a z/OS UNIX file. The name of the transform program is case-sensitive. You can specify one of these command names: pcl2afp, pdf2afp, ps2afp, sap2afp.
```
If the transform program does not reside in one of the directories specified in the PATH environment variable, also specify the pathname. You can use the STDENV DD statement to set the PATH environment variable if the default value set by AOPBATCH is not suitable. For information about the defaults set for environment variables, see "AOPBATCH DD statements."

**transform_options**

Options and arguments accepted by the transform. For a description of each, see [pcl2afp—Transform PCL data to AFP data](#) on page 13, [pdf2afp—Transform PDF data to AFP data](#) on page 17, [ps2afp—Transform PostScript data to AFP data](#) on page 24 or [sap2afp—Transform SAP OTF or ABAP data to AFP data](#) on page 32.

You must specify the transform input data set or file as a transform argument, and you must specify the \(-o\) transform option to identify where you want the transform to write its output. (This is because the transform cannot write its output to standard output and cannot read input from standard input.) To identify the transform input and output data set or file, you can specify either a DD statement name or a data set or file name. You must specify a DD statement name if you want to write the transform output to an MVS data set that does not already exist.

Specify the names of DD statements to the transform in this format:

```
/ //DD:DDname
```

The name of the DD statement is **DDname**.

When you specify an MVS data set name in the \(-o\) option, code two slashes before the data set name and enclose the data set name in two sets of single quotation marks if you specify a fully qualified data set name. If you do not enclose the data set name in quotation marks, a high-level qualifier is added to the name you specify:

- If you are running under TSO (batch or interactive), the TSO user prefix is appended.
- If you are running under MVS batch or IMS™ (batch or online), the RACF® user ID is appended.
- If your system does not use RACF, a high-level qualifier is not added.

For examples of different ways to specify transform input and output data sets and files, see "AOPBATCH examples" on page 38.

### AOPBATCH DD statements

The AOPBATCH JCL procedure accepts these standard DD statements:

**STDENV**

Specifies environment variables for use by the transform. You can specify the environment variables in-stream in the JCL, in an MVS data set, or in a UNIX file. Specify the environment variables in the format `variable=value`, with one environment variable per line or record. Sequence numbers in columns 73 - 80 in data specified with the STDENV DD statement are ignored and *not* treated as part of the data.

If you omit the STDENV DD statement or do not specify one of the environment variables, AOPBATCH sets these default values, which are suitable for running Infoprint Server programs if your installation installed Infoprint Server files in the default directories:

```
PATH=/usr/lpp/Printsrv/bin:/bin:/usr/bin
LIBPATH=/usr/lpp/Printsrv/lib:/lib:/usr/lib
NLSPATH=/usr/lpp/Printsrv/Intl:/usr/lpp/Printsrv/En_US:/usr/lib/nls/msg/15/15
```
AOPBATCH also sets the HOME environment variable to the user’s home directory and sets the LOGIN variable to the user ID.

**Note:** Do not specify the _BPX_SHAREAS environment variable. AOPBATCH will set it appropriately.

**STDERR**
Specifies the system output data set where error messages are to be written. The data set can be an MVS data set or a UNIX file. The transforms do not write messages related to errors in the input data stream in this data set. Instead, the transforms write these messages at the end of the output document.

**STDOUT**
Specifies the system output data set where informational messages are to be written. The data set can be an MVS data set or a UNIX file.

You can also include DD statements to specify MVS data sets that contain input data to be transformed, the transformed output, or job attributes that are input to the transform.

**Rules**
- Do *not* use DD names STDIN, STDOUT, or STDERR to specify the transform input and output data sets. Instead, use other DD names, such as INPUT and OUTPUT, which are used in the examples.
- If you have not added the Language Environment run-time library (CEE.SCEERUN) or the C++ run-time library (CBC.SCLBDLL) to the system LNKLST, specify these data sets in a STEPLIB DD statement.
- The PDF to AFP and the PostScript to AFP transforms cannot transform concatenated input files. If you want to transform more than one PDF or PostScript file in the same job, create a separate step to transform each file. (The PCL to AFP transform can transform concatenated input files.) See "AOPBATCH examples" on page 38 for an example of how to transform and print multiple PDF files in the same job.
- If you want to write the AFP data stream to an MVS data set, you must allocate and catalog the MVS data set before you run AOPBATCH or include a DD statement in the AOPBATCH job to allocate the data set. Allocate a data set with these characteristics:
  - Record format: VBM.
  - Record length: 8192 (8K) or larger.
  - Disposition: SHR or OLD overwrites any existing data in the data set; MOD appends the output to any existing data. MOD is the default.

Allocate an MVS data set that is large enough to hold the AFP data stream. The size of the AFP data stream depends on the size and complexity of the document, the type of image compression, and the resolution of the image. Typically, the PCL to AFP, PDF to AFP, and PostScript to AFP transforms create an output AFP data stream that is several times as large as the input data stream. For more information about the size of the AFP data stream, see "Calculating the size of the AFP data stream" on page 41.

**Note:** If you specify an MVS output data set that does not exist, the transform creates the data set; however, the data set does not have the correct record format and record length. If you attempt to print the data set, PSF for z/OS writes message APS114I.
AOPBATCH examples

These examples show how to use the AOPBATCH procedure to transform data. For additional AOPBATCH examples, see z/OS Infoprint Server User’s Guide.

Specify transform input and output in MVS data sets, and specify environment variables

This example shows how to transform data when the transform input is in an MVS data set and transform output is written to an MVS data set. The PostScript to AFP transform reads PostScript input from data set HLQ.INPUT.PS and writes AFP output to data set HLQ.OUTPUT.AFP. HLQ represents the high-level qualifier; for example, your TSO or RACF user ID.

This example also shows how to specify environment variables in-stream in the STDENV DD statement. If you installed Infoprint Server and created Infoprint Server configuration files in default directories, you do not need to specify these environment variables and you can omit the STDENV DD statement.

```
//AOPBATCH JOB ...
//TRANSFRM EXEC PGM=AOPBATCH,PARM='/ps2afp -c letter -r 300 -o //DD:OUT
// PUT DD:INPUT'
//INPUT DD DSN=HLQ.INPUT.PS,DISP=SHR
//OUTPUT DD DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
// DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),SPACE=(CYL,(1,1))
//STDOUT DD SYSOUT=*
//STDDERR DD SYSOUT=*
//STDENV DD *
PATH=/usr/lpp/Printsrv/bin:/bin:/usr/bin
LIBPATH=/usr/lpp/Printsrv/lib:/lib:/usr/lib
NLSPATH=/usr/lpp/Printsrv/En_US/%N:/usr/lib/nls/msg/En_US/%N
AOPCONF=/etc/Printsrv/aopd.conf
/*
```

Specify transform input in a UNIX file and output in an MVS data set

This example shows how to transform data when the transform input is in a UNIX file and transform output is written to an MVS data set. The PDF to AFP transform reads the PDF input from file /tmp/input.pdf and writes AFP output to HLQ.OUTPUT.AFP.

```
//AOPBATCH JOB ...
//TRANSFRM EXEC PGM=AOPBATCH,PARM='/pdf2afp -c letter_300 -o //DD:OUTPU
// T /tmp/input.pdf'
//OUTPUT DD DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
// DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),SPACE=(CYL,(1,1))
//STDOUT DD SYSOUT=*
//STDDERR DD SYSOUT=*
```

Transform and print multiple PDF data sets

This example shows how to transform two PDF data sets and write the output to the same AFP data set. You cannot transform more than one PDF data set in the same step because the JCL concatenates the PDF data.

In the first step, the PDF to AFP transform reads PDF input from data set HLQ.INPUT1.PDF and writes AFP output to data set HLQ.OUTPUT.AFP, where HLQ represents the high-level qualifier; for example, your TSO or RACF user ID.

In the second step, the transform reads PDF input from data set HLQ.INPUT2.PDF and writes AFP output to the same data set as in the first step.
In the third step, the AOPPRINT JCL procedure prints the AFP output to the printer named mypsfprinter, which is defined in the Printer Inventory. For information about AOPPRINT, see z/OS Infoprint Server User's Guide.

```
//AOPBATCH JOB ....REGION=128M
//TRANS1 EXEC PGM=AOPBATCH,
  // PARM='/pdf2afp -o //DD:OUTPUT DD:INPUT'
  //INPUT DD DSN=HLQ.INPUT1.PDF,DISP=SHR
  //OUTPUT DD DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
    // DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),
    // SPACE=(CYL,(30,5))
  //STDOUT DD SYSOUT=*  //STDERR DD SYSOUT=*  //*
/* Transform the second PDF file, write the AFP output */
/* to the same data set as in step TRANS1. */
//TRANS2 EXEC PGM=AOPBATCH,
  // PARM='/pdf2afp -o //DD:OUTPUT DD:INPUT'
  //INPUT DD DSN=HLQ.INPUT2.PDF,DISP=SHR
  //OUTPUT DD DSN=HLQ.OUTPUT.AFP,DISP=MOD
  //STDOUT DD SYSOUT=*  //STDERR DD SYSOUT=*  //*
/* Print the data set with the AFP output. */
//PRINT EXEC AOPPRINT,PRINTER='mypsfprinter'
  //SYSIN DD DSN=HLQ.OUTPUT.AFP,DISP=SHR
```

Transform and print data sets
This example shows how to transform data and print the output from the transform in a subsequent step.

In the first step, the PostScript to AFP transform reads PostScript input from data set HLQ.INPUT.PS and writes AFP output to data set HLQ.OUTPUT.AFP, where HLQ represents the high-level qualifier; for example, your TSO or RACF user ID.

In the second step, the AOPPRINT JCL procedure prints the AFP output to the printer named mypsfprinter, which is defined in the Printer Inventory. For information about AOPPRINT, see z/OS Infoprint Server User's Guide.

```
//AOPBATCH JOB ...
//TRANSFRM EXEC PGM=AOPBATCH,PARM='/ps2afp -o //DD:OUTPUT //DD:INPUT'
//INPUT DD DSN=HLQ.INPUT.PS,DISP=SHR
//OUTPUT DD DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE),
  // DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),SPACE=(CYL,(1,1))
  //STDOUT DD SYSOUT=*  //STDERR DD SYSOUT=*  //*
/* Print the data set with the AFP output. */
//PRINT EXEC AOPPRINT,PRINTER='mypsfprinter'
  //SYSIN DD DSN=HLQ.OUTPUT.AFP,DISP=SHR
```

Continuing parameter fields in JCL
To continue a parameter field:

1. Interrupt the field after a complete parameter or subparameter, including the comma that follows it, at or before column 71.
2. Code // in columns 1 and 2 of the following statement.
3. Code a blank character in column 3 of the following statement.
4. Continue the interrupted parameter or field beginning in any column from 4 through 16.

To continue a parameter that is enclosed in apostrophes:

1. Extend the parameter to column 71. Do not code an apostrophe in column 71.
2. Code // in columns 1 and 2 of the following statement.
3. Continue the parameter in column 16 of the following statement even if this splits the parameter.
Exit values

AOPBATCH returns the exit code of the spawned process. If AOPBATCH cannot execute the program, it returns RC=4. If a transform command fails, it returns RC=1.

Using the Print Interface subsystem

You can use the Print Interface subsystem (provided with Infoprint Server) to transform data created by a batch application to AFP format so that it can be printed on an AFP printer. The Print Interface subsystem writes the AFP output from the transform to an output data set on the JES spool. PSF can then print the output data set on an AFP printer.

For information about the Print Interface subsystem, see "Transforming data using the Print Interface subsystem" in z/OS Infoprint Server User's Guide.

Example: This example shows how to print a PDF document created by a batch application on an AFP printer using form definition F1MYDEF, which is in library USERA.MYLIB, to format the AFP data. It assumes that:

- The Print Interface subsystem named AOP1 has been started.
- Printer definition myafpprinter exists in the Infoprint Server Printer Inventory with these characteristics:
  - The PDF to AFP transform is specified.
  - The class and destination name for the PSF-controlled AFP printer are specified. (CLASS and DEST are JES work-selection parameters that can direct output from the JES spool to a PSF-controlled printer.)

```plaintext
//SUBSYS JOB ...
//STEP1 EXEC PGM=USERA
//OUTDS1 OUTPUT FORMDEF=F1MYDEF,USERLIB=USERA.MYLIB
//DD1 DD SUBSYS=(AOP1,'myafpprinter'),OUTPUT=*.OUTDS1
```

Using the lprafp command

The lprafp command lets you print documents from Windows systems and UNIX systems (such as HP-UX and SunOS) and specify Infoprint Server job attributes. For example, when you use the lprafp command, you can specify the name of a form definition in the form-definition attribute and the number of copies in the copies attribute.

You might want to use the lprafp command to print PDF or PostScript documents that are on your Windows or UNIX systems.

You can download the lprafp command from the Printing Systems Web site at [http://www.ibm.com/printers/download.html](http://www.ibm.com/printers/download.html). On this Web site, you can also find information about how to use the command.

Example: This example shows how to print two copies of a PDF document named myfile.pdf on an AFP printer named myafpprinter using form definition F1FORM to format the AFP data. It assumes that:

- The host name of the z/OS system where Infoprint Server is running is systema.
- Printer definition myafpprinter exists in the Infoprint Server Printer Inventory with these characteristics:
  - The PDF to AFP transform is specified.
The class and destination name for the PSF-controlled AFP printer are specified. (CLASS and DEST are JES work-selection parameters that can direct output from the JES spool to a PSF-controlled printer.)

lprafp -o"XAOP form-definition=f1form copies = 2" -p myafpprinter -s systema myfile.pdf

Calculating the size of the AFP data stream

If a transform command writes the AFP data stream to an MVS data set, you must allocate an MVS data set that is large enough to hold the AFP data stream. Typically, the AFP data stream is several times as large as the input data stream.

The size of the AFP data stream depends on the size and complexity of the document, whether the AFP images are compressed, and the resolution of the images. You specify the type of image compression in the -a option of the transform command. You specify the resolution either in the -r option of the transform command (PDF to AFP, PostScript to AFP, and SAP to AFP transforms) or in the AOP_RESOLUTION environment variable (PCL to AFP transform).

Steps for calculating the size of the AFP data stream:

1. Use these formulas to calculate the number of bytes per page:

   page width * resolution * page height * resolution = bits per page
   bits per page / 8 = bytes per page

   The page width, page height, and resolution must be in the same units.
   For example, for an 8.5 x 11 inch page at 600 pels (bits) per inch resolution:
   (8.5 * 600 * 11.0 * 600) / 8 = 4,207,500 bytes per page

   Note: If the pages contain blank areas, which is typical of most text pages, the number of bytes per page can be substantially smaller.

2. If the transform creates a compressed IOCA image (G4 MMR or MMR format), multiply the bytes per page by 50%. For example:
   4,207,500 * 0.5 = 2,103,750 bytes per page

3. Multiply the number of bytes per page by the number of pages in the document.
   For example, for 100 pages:
   2,103,750 * 100 = 210,375,000 bytes in AFP data stream

   Note: The SAP to AFP transform does not produce full-page AFP images. This transform creates an AFP data stream that is approximately the same size as the input data stream.

Tip: To reduce the size of the AFP data stream:

- Specify the lowest resolution that produces good quality output. A resolution of 300 pels typically produces good quality output on 300 or 600 pel printers. 300 pel output requires one-fourth the space and transmission time than 600 pel output. (The default resolution for the PDF to AFP, PostScript to AFP, and SAP to AFP transforms is 600 pels. The default resolution for the PCL to AFP transform is 240 pels.)
- Specify compressed IOCA images (-a io1-g4 or -a io1-mmr). Specify uncompressed IOCA or IM1 images only if you know that your printer does not support compressed images. Most newer printers support compressed IOCA images.
- Do not specify IM1 images at a resolution that the printer does not support because Print Services Facility (PSF) converts the IM1 images to uncompressed...
IOCA images at the resolution the printer requires. This conversion can cause PSF to use very large amounts of CPU time.
Chapter 3. Customizing transforms

This chapter describes how to customize the transforms:

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Customizing the PCL to AFP transform

To customize the PCL to AFP transform, do the tasks listed in this table. Required tasks are required by all installations. Optional tasks are required only if the listed condition applies to your installation.

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Specifying transform options

You must create at least one transform entry in the Infoprint Server transform configuration file (aopxfd.conf) for the PCL to AFP transform. In the transform entry, you can specify:

- Environment variables that control the transform
- Attributes that control how the Infoprint Server Transform Manager manages the transform

For information about how to create and edit the Infoprint Server transform configuration file, see "Creating the transform configuration file (aopxfd.conf)" in z/OS Infoprint Server Customization. After you update the transform configuration file, you must restart the Infoprint Server Transform Manager.

Tip: After you restart the Transform Manager, check for error messages in the transform’s stderr file. If you find any error messages, fix the errors and restart the Transform Manager. For more information about how to find the transform message logs, see “Finding the transform stderr file” on page 88.

Transform classes

If you want to specify different transform options for different printers, you can create different classes of the transform. For example, you could create classes for printers that print on different paper sizes.

For each transform class, you must create a separate transform entry. You select a name for the transform class in the transform entry (see the transform attribute).

To use a transform class, job submitters must specify the class name in the -c option on the pcl2afp transform command or in the filter-options job attribute, and administrators must specify the class name in the -c filter option in the printer definition. For example, these z/OS UNIX commands use the “letter_300” transform class:

```
pcl2afp -c letter_300 -o myfile.afp myfile pcl
lp -d myprinter -o "filter-options='-c letter_300''" myfile.pcl
```
Tip: The sample transform configuration file, `/usr/lpp/Printsrv/samples/aopxfd.conf`, shows examples of transform entries with different transform classes. Also, see "Examples -- Transform configuration file entries for the PCL to AFP transform" on page 49.

Format of a PCL to AFP transform entry
The format of a PCL to AFP transform entry in the transform configuration file (aopxfd.conf) is:

```
transform pcl2afp[transformclass]
  start-command = "pcl2afpd [-m nnn[K|M]]"
  [ environment = {name -> value [name -> value]...} ]
  [ maximum-active = number ]
  [ maximum-idle-time = seconds ]
  [ minimum-active = number ]
;
```

This statement indicates the beginning of a transform entry.

```
pcl2afp
  The name of the transform.

transformclass
  The name of an optional transform class. Specify from 1 to 63 characters, including letters, numbers, or special characters. The name of the transform class is case-sensitive.

Default: No transform class.

Example: transform pcl2afp_letter_300
```

```
start-command = "pcl2afpd [-m nnn[K|M]]"
  This attribute names the transform daemon and option. Enclose the value in single or double quotation marks if you specify the option.

pcl2afpd
  The name of the transform daemon. If the transform daemon is not in a directory identified in the PATH environment variable in the aopstart EXEC, specify the full directory path name of the daemon. (The pcl2afpd daemon is installed in `/usr/lpp/Printsrv/bin`. This attribute is required.

-m nnn[K|M]
  The maximum number of bytes of memory the transform can use. Specify the number of bytes in either kilobytes (K) or megabytes (M). The amount of memory required depends on the compression type, the image being compressed, fonts, and so on.

Use this algorithm or see the next table to determine the number of megabytes to initially specify. If the transform fails due to lack of memory, increase the amount of memory.

Megabytes = ((width in pels / 8) * height in pels) * 3

Width in pels = (width in inches * resolution)
Height in pels = (height in inches * resolution)
```

This table shows the amount of storage for different paper sizes and resolutions (240, 300, and 600 pels per inch), using the previous algorithm:
Environment variables let you specify:

- Height and width of the page
- Margins of the page
- Resolution of the printer
- Record length of AFP images
- Tracing options
You can specify these environment variables. All environment variables are optional.

_BPX_JOBNAME

The job name for this transform. When you assign a different job name to each class of transform, the operator can manage the transform daemons more effectively. Specify a job name of 1 to 8 alphanumeric characters. Incorrect job names are ignored. For more information about the _BPX_JOBNAME variable, see z/OS UNIX System Services Planning

Default: The job name is AOPXFD.

Example: environment = {_BPX_JOBNAME -> PCL2AFPD}

AOP_FAIL_ON_ERROR

Specifies whether the transform stops processing when an error occurs during the transform.

Valid values are:

yes  The transform stops processing when any error occurs during the transform and does not create an output document. The return code from the transform is >0. The transform stderr file contains message AOP2501E and the transform error messages.

no   The transform continues processing when certain types of errors occur during the transform, such as data stream errors. If possible, the transform creates an output document that contains the transform error messages. The return code from the transform is 0.

Default: AOP_FAIL_ON_ERROR -> no

Example: environment = {AOP_FAIL_ON_ERROR -> yes}

Note: If the transform uses a substitute font, it does not consider this an error. The transform always continues processing.

AOP_HORIZONTAL_MARGINS

The left and right margins of the page. Specify a number followed by one of these units:

in   Inches

mm   Millimeters

pel  Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Default: AOP_HORIZONTAL_MARGINS -> 0.167in

AOP_PAGE_HEIGHT

The height of the page. Specify a number followed by one of these units:

in   Inches

mm   Millimeters

pel  Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Default: AOP_PAGE_HEIGHT -> 11in
AOP_PAGE_WIDTH
The width of the page. Specify a number followed by one of these units:

- in  Inches
- mm  Millimeters
- pel Pels, the default unit

Inch values and millimeter values can contain a decimal point. Pel values cannot.

Default: AOP_PAGE_WIDTH -> 8.5in

AOP_RECLEN
The length of the AFP images the transform creates. Each output record
contains an AFP image and an additional 17 bytes of information (for example,
header information). For example, if you specify a value of 8 (8,000 bytes) for
the AFP image in this environment variable, the length of each output record is
8,017 bytes.

Valid values are from 8 to 32, in units of 1,000 bytes. For example, 8 = 8,000.

Tip: The default value is suitable for most installations. However, a larger
record length might improve performance.

Default: AOP_RECLEN -> 8

Example: environment = {AOP_RECLEN -> 16}

AOP_RESOLUTION
The resolution in pels per inch of the printer. The transform creates the AFP
images with this resolution. Valid values: 240, 300, 480, and 600.

Default: AOP_RESOLUTION -> 240

Example: environment = {AOP_RESOLUTION -> 300}

Tips:
1. If you specify a resolution that the printer does not support, PSF prints the
   image under most conditions, but sometimes with degraded results.
2. A resolution of 300 pels typically produces good quality output on 300 or
   600 pel printers. 300 pel output requires one-fourth the space and
   transmission time.

AOP_RESOURCE_PATH
The directory that contains the fonts that are provided with the transform. If you
installed the fonts in the default directory, /usr/lpp/Printsrv/pcl2afpv2/fonts,
you do not need to specify this environment variable. The transform always
looks for fonts in the default font directory last.

Default: AOP_RESOURCE_PATH -> /usr/lpp/Printsrv/pcl2afpv2/fonts

Example:
   environment = {AOP_RESOURCE_PATH -> /etc/Printsrv/pcl2afpv2/fonts}

AOP_VERTICAL_MARGINS
The top and bottom margins of the page. Specify a number followed by one of
these units:

- in  Inches
- mm  Millimeters
- pel Pels, the default unit
Inch values and millimeter values can contain a decimal point. Pel values cannot.

**Default:** `AOP_VERTICAL_MARGINS` --> 0.167 in

**AOPTRACEDIR**
The full path name of the directory where the transform writes trace information. You can specify the same directory for different transform classes. The name of the trace file identifies the transform and transform class, and contains a timestamp.

This directory must already exist. If the directory does not exist, the transform writes trace information to the transform's `stderr` file. For information about how to find the `stderr` file, see “Finding the transform `stderr` file” on page 88.

**Default:** `AOPTRACEDIR` -> /var/Printsrv/trace

**Examples:**
- `environment = {AOPTRACEDIR -> /var/Printsrv/xfd}`
- `environment = {AOPTRACEDIR -> .}`

**AOPTRACEON**
Turns tracing on. The transform traces all transform requests that use this transform class. Any value turns tracing on. To turn tracing off, do not specify this environment variable. Specify this environment variable only if IBM directs you to do so. Tracing can adversely affect performance.

**Default:** Tracing is turned off.

**Example:** `environment = {AOPTRACEON -> 1}`

**AOP_TRIM**
Indicates whether the transform creates trimmed AFP images or full-page AFP images. Trimmed AFP images are smaller than full-page AFP images. Therefore, AFP output files that contain trimmed AFP images are smaller and can be transmitted more quickly over a network.

In contrast to full-page AFP images, trimmed AFP images do not include any white space that surrounds the data on the page. The transform positions trimmed AFP images on the page so that the data prints in the correct position on the page. For example, if a page is 8 1/2 by 11 inches and has a 1 inch margin on all sides:

- A trimmed AFP image is 6 1/2 x 9 inches. It is positioned at offset 1 inch (x), 1 inch (y) on the page.
- A full-page AFP image is 8 1/2 by 11 inches. It is positioned at offset 0 (x), 0 (y) on the page.

AFP documents print the same whether you specify `AOP_TRIM = yes` or `AOP_TRIM = no`. However, AFP overlays and AFP page segments typically print differently because trimmed AFP images are smaller than full-page AFP images. A page segment that contains a trimmed AFP image typically prints higher and to the left on a page. (The `-t` transform option determines the type of output. For example, `-t pagesegment` creates a page segment.)

**Values are:**
- **yes** The transform creates trimmed AFP images (default).
- **no** The transform creates full-page AFP images.

The V1 transforms always create full-page AFP images. To create full-page AFP images in V2, you must specify the `AOP_TRIM= no` environment variable.
Tip: In addition to the environment variables listed in this section, you can specify other environment variables. For example, you can specify the _CEE_RUNOPTS environment variable. For information, see "Changing Language Environment run-time options."

Examples -- Transform configuration file entries for the PCL to AFP transform
This section shows sample transform entries in the Infoprint Server transform configuration file (aopxfd.conf) for the PCL to AFP transform.

Print on letter size paper on 300-pel printers: This transform entry can be used for printers that print on letter size paper (8.5 inches wide, 11 inches high) and that have a resolution of 300 pels per inch. This transform entry creates transform class "letter_300". To use this transform class, specify the class in the -c transform option as shown in these two examples:

```
pcl2afp -c letter_300 -o myfile.afp myfile.pcl
lp -o "filter-options='-c letter_300'" -d myprinter myfile.pcl
```

```
transform pcl2afp_letter_300
  start-command = "pcl2afpd -m 4M"
  maximum-active = 2
  maximum-idle-time = 300 # 5 minutes
  minimum-active = 1
  environment = {
    _BPX_JOBNAME -> PCL2AFPD
    AOP_PAGE_HEIGHT -> 11in
    AOP_PAGE_WIDTH -> 8.5in
    AOP_HORIZONTAL_MARGINS -> 0.167in
    AOP_VERTICAL_MARGINS -> 0.167in
    AOP_RESOLUTION -> 300
  }
```

Print on A4 paper on 300-pel printers: This transform entry can be used for printers that print on A4 paper (210 millimeters wide, 297 millimeters high). This transform entry creates transform class "a4_300". To use this transform class, specify the class in the -c transform option as shown in these two examples:

```
pcl2afp -c a4_300 -o myfile.afp myfile.pcl
lp -o "filter-options='-c a4_300'" -d myprinter myfile.pcl
```

```
transform pcl2afp_a4_300
  start-command = "pcl2afpd -m 4M"
  maximum-active = 2
  maximum-idle-time = 300 # 5 minutes
  minimum-active = 1
  environment = {
    _BPX_JOBNAME -> PCL2AFPD
    AOP_PAGE_HEIGHT -> 297mm
    AOP_PAGE_WIDTH -> 210mm
    AOP_HORIZONTAL_MARGINS -> 4.242mm
    AOP_VERTICAL_MARGINS -> 4.242mm
    AOP_RESOLUTION -> 300
  }
```

Changing Language Environment run-time options
The transform sets these run-time options for the Language Environment (LE):

- ALL31(ON)
- ANYHEAP(16K,8K,ANYWHERE,FREE)
- BELOWHEAP(8K,4K,FREE)
- DEPTHCONDLMT(10)
If you need to change any of these options, you can specify a new value by setting the _CEE_RUNOPTS environment variable in the transform configuration file, aopxfd.conf.

For example, to change the ERRCOUNT value, specify this environment variable:

```
_CEE_RUNOPTS -> 'ERRCOUNT(4)'  
```

**Guideline:** Do not specify smaller initial allocation sizes in the ANYHEAP, HEAP, STACK, and THREADSTACK options. Setting smaller values can cause severe performance degradation.

For more information, see:

- “Specifying transform options” on page 43
- z/OS XL C/C++ Programming Guide

### Customizing the PDF to AFP and PostScript to AFP transforms

To customize the PDF to AFP and PostScript to AFP transform, do the tasks listed in this table. Required tasks are required by all installations. The customization tasks are the same for both transforms. Optional tasks are required only if the listed condition applies to your installation.

**Tip:** The same transform daemon (ps2afpd) transforms both PDF and PostScript data streams. Therefore, the customization tasks for the PDF to AFP transform and the PostScript to AFP transform are the same.

<table>
<thead>
<tr>
<th>Task</th>
<th>Condition</th>
<th>See page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specifying transform options</td>
<td>Required</td>
<td>50</td>
</tr>
<tr>
<td>Starting Infoprint Server with sufficient memory</td>
<td>Required</td>
<td>57</td>
</tr>
<tr>
<td>Setting up security</td>
<td>Required</td>
<td>58</td>
</tr>
<tr>
<td>Adding fonts</td>
<td>Optional: To add custom fonts</td>
<td>60</td>
</tr>
</tbody>
</table>

### Specifying transform options

You must create at least one transform entry in the Infoprint Server transform configuration file (aopxfd.conf) for the PDF to AFP and PostScript to AFP transform. In the transform entry, you can specify:

- Environment variables that control the transform
- Attributes that control how the Infoprint Server Transform Manager manages the transform
For information about how to create and edit the Infoprint Server transform configuration file, see "Creating the transform configuration file (aopxfd.conf)" in z/OS Infoprint Server Customization. After you update the transform configuration file, you must restart the Infoprint Server Transform Manager.

Tip: After you restart the Transform Manager, check for error messages in the transform's stderr file. If you find any error messages, fix the errors and restart the Transform Manager. For more information about how to find the transform message logs, see "Finding the transform stderr file" on page 88.

Transform classes
If you want to specify different transform options for different transform situations, you can create different classes of the transform. For example, you could create a separate class that turns tracing on. You could use this transform class if IBM directs you to trace the transform.

For each transform class, you must create a separate transform entry. You select a name for the transform class in the transform entry (see the transform attribute).

To use a transform class, job submitters must specify the class name in the -c option on the pdf2afp or ps2afp transform command or in the filter-options job attribute, and administrators must specify the class name in the -c filter option in the printer definition. For example, these z/OS UNIX commands use the “trace” transform class:

```
pdf2afp -c trace -o myfile.afp myfile.pdf
lp -d myprinter -o "filter-options='c trace'" myfile.pdf
```

Tip: The sample transform configuration file, /usr/lpp/Printsrv/samples/aopxfd.conf, shows examples of transform entries with different transform classes. Also, see "Examples -- Transform configuration file entries for the PDF to AFP and PostScript to AFP transforms" on page 56.

Format of a PDF to AFP and PostScript to AFP transform entry
The format of a PDF to AFP and PostScript to AFP transform entry in the transform configuration file (aopxfd.conf) is:

```
transform ps2afp[transformclass]
  start-command = "ps2afpd [-m nnnnnnK|M]"
  [ environment = {name -> value [ name -> value]... } ]
  [ maximum-active = number ]
  [ maximum-idle-time = seconds ]
  [ minimum-active = number ]
; transform ps2afp[transformclass]
```

This statement indicates the beginning of a transform entry.

```
ps2afp
```

The name of the PDF and PostScript to AFP transform.

```
transformclass
```

The name of an optional transform class. Specify from 1 to 63 characters, including letters, numbers, or special characters. The name of the transform class is case-sensitive.

Default: No transform class.

Example: transform ps2afp_trace
start-command = "ps2afpd [-m nnnnnn[KIM]]"
This attribute names the transform daemon and option. Enclose the value in single or double quotation marks if you specify the option.

ps2afpd
The name of the transform daemon. If the transform daemon is not in a directory identified in the PATH environment variable in the aopstart EXEC, specify the full directory path name of the daemon. (The ps2afpd daemon is installed in /usr/lpp/Printsrv/bin.) This attribute is required.

-m nnnnnn[KIM]
The maximum number of bytes of memory the transform daemon uses to do transforms. Specify the number of bytes in either kilobytes (K) or megabytes (M).

Suggested values are:

- 15M to 1024M
- 15360K to 1048576K

The amount of memory the transform requires depends on the complexity of the documents to be transformed. If you specify too low a value, the transform of complex PDF or PostScript documents might fail with undefined PostScript errors. If this occurs, try increasing the value in this option.

You must specify a maximum region size that is at least 10M greater than the value you specify in this option. For example, if you specify -m 1024M, set the region size to at least 1034M (1024M + 10M). For information about how to specify the region size, see “Starting Infoprint Server with sufficient memory” on page 57.

Note: IBM recommends a region size of at least 256M. If the region size is too low, the transform fails due to lack of memory.

Default: 32M

Example: start-command = "ps2afpd -m 246M"

environment = {name -> value [name -> value]... }
Environment variables that specify transform options. Enclose the entire set of environment variables in braces. The values in these environment variables override environment variables with the same name that are set in the aopstart EXEC. If a value contains special characters or spaces, enclose the value in single or double quotation marks.

For information about the environment variables you can specify, see “Environment variables for the PDF to AFP and PostScript to AFP transforms” on page 53.

Default: None

Example:
environment = {AOPRESOURCE_PATH -> /etc/Printsrv/ps2afpv2/fonts}

maximum-active = number
The maximum number of transform daemons that the Transform Manager activates concurrently. Specify a number greater than 0 and greater than or
equal to the number specified in the minimum-active attribute. For more information, see "Format of a transform entry" in z/OS Infoprint Server Customization.

Default: No maximum number. Transform daemons are started when needed.

maximum-idle-time = seconds
The number of seconds before the Transform Manager shuts down an idle transform daemon and system resources are freed. Specify a number greater than 0. For more information, see "Format of a transform entry" in z/OS Infoprint Server Customization.

Default: Idle transform daemons are not shut down.

minimum-active = number
The minimum number of transform daemons that the Transform Manager activates concurrently. Specify a number less than or equal to the number specified in the maximum-active attribute. For more information, see "Format of a transform entry" in z/OS Infoprint Server Customization.

Default: minimum-active = 0

Environment variables for the PDF to AFP and PostScript to AFP transforms
Environment variables let you specify:
• Directory that contains transform resources
• Record length of AFP images
• Tracing options

You can specify these environment variables. All environment variables are optional.

_BPX_JOBNAME
The job name for this transform. When you assign a different job name to each class of transform, the operator can manage the transform daemons more effectively. Specify a job name of 1 to 8 alphanumeric characters. Incorrect job names are ignored. For more information about the _BPX_JOBNAME variable, see z/OS UNIX System Services Planning.

Default: The job name is AOPXFD.

Example: environment = {
          _BPX_JOBNAME -> PS2AFPD
        }

_CEE_DMPTARG
The directory where Language Environment (LE) writes a CEEDUMP. You can specify a period (.) to write the CEEDUMP to the transform's current working directory. IBM customer service expects to find CEEDUMPs in the transform's current working directory.

The transform's current working directory is: base-directory/xfd/ps2afp.##.d.
base-directory is the base directory specified in the Infoprint Server configuration file, aopd.conf. An example of the transform's current working directory is:
/var/Printsrv/xfd/ps2afp.0.d

If you specify a directory other than the transform's current working directory, make sure that the user ID that owns the ps2afpd file has write access to the directory. For example, if user NOBODY owns transform file ps2afpd, user NOBODY must have write access to the directory.
**Default:** LE writes the dump to the directory specified in the TMPDIR environment variable. If the TMPDIR environment variable is not specified, LE writes the dump to the /tmp directory.

**Example:** `environment = {_CEE_DMPTARG -> .}`

**Note:** For other transforms, such as the PCL to AFP transform, LE writes the CEEDUMP to the transform's current working directory by default. This is because the owners of the other transforms have write access to the Infoprint Server base directory. Therefore, you do not need to specify the _CEE_DMPTARG environment variable for other transforms. For more information about how LE determines where to write the CEEDUMP, see the [z/OS Language Environment Debugging Guide](#).

**AOP_FAIL_ON_ERROR**

Specifies whether the transform stops processing when an error occurs during the transform.

Valid values are:

- **yes** The transform stops processing when any error occurs during the transform and does not create an output document. The return code from the transform is >0. The transform stderr file contains message AOP2501E and the transform error messages.

- **no** The transform continues processing when certain types of errors occur during the transform, such as data stream errors. If possible, the transform creates an output document that contains the transform error messages. The return code from the transform is 0.

**Default:** AOP_FAIL_ON_ERROR -> no

**Example:** `environment = {AOP_FAIL_ON_ERROR -> yes}`

**Note:** If the transform uses a substitute font, it does not consider this an error. The transform always continues processing.

**AOP_FONT_SUBSTITUTION_MESSAGES**

Indicates whether the transform writes a message (AOP2500W) in the transform's stderr file when it substitutes fonts in a document if no other errors occurred. The transform substitutes a similar font when it cannot find a font that the document requests. If a document is transformed with no font substitution, the transform does not write a message.

Font-substitution messages let you determine if the transform has used substitute fonts. If a substitute font is not acceptable, you might be able to add the original font to the transform. For information, see "Adding fonts" on page 60.

Valid values are:

- **yes** The transform writes messages about font substitution.

- **no** The transform does not write messages about font substitution.

**Default:** AOP_FONT_SUBSTITUTION_MESSAGES -> yes

**Example:** `environment = {AOP_FONT_SUBSTITUTION_MESSAGES -> no}`

**AOP_RECLEN**

The length of the AFP images the transform creates. Each output record contains an AFP image and an additional 17 bytes of information (for example,
header information). For example, if you specify a value of 8 (8,000 bytes) for
the AFP image in this environment variable, the length of each output record is
8,017 bytes.

Valid values are from 8 to 32, in units of 1,000 bytes. For example, 8 = 8,000.

**Tip:** The default value is suitable for most installations. However, a larger
record length might improve performance.

**Default:** AOP_RECLEN -> 8

**Example:** environment = {AOP_RECLEN -> 16}

**AOP_RESOURCE_PATH**

The directories that contains fonts and other transform resources. If the fonts
and other resources are in more than one directory, list all directories separated
by a colon. The directories are searched in the order that they are listed. Do not
list the default resource directories because the transform always searches
these directories last. For more information, see “Adding fonts” on page 60.

**Default:**

AOPRESOURCE_PATH --> /usr/lpp/Printsrv/ps2afpv2/lib:/usr/lpp/Printsrv/
ps2afpv2/Resource: /usr/lpp/Printsrv/ps2afpv2/fonts

**Example:**

evironment = {AOPRESOURCE_PATH -> /etc/Printsrv/ps2afpv2/fonts}

**AOPTRACEDIR**

The full path name of the directory where the transform writes trace information.
You can specify the same directory for different transform classes. The name of
the trace file identifies the transform and transform class, and contains a
timestamp.

**Default:** AOPTRACEDIR -> /var/Printsrv/trace

**Examples:**

environment = {AOPTRACEDIR -> /var/Printsrv/trace}

environment = {AOPTRACEDIR -> /var/Printsrv/xfd}

environment = {AOPTRACEDIR -> .}

**AOPTRACEON**

Turns tracing on. The transform traces all transform requests that use this
transform class. Any value turns tracing on. To turn tracing off, do not specify
this environment variable. Specify this environment variable only if IBM directs
you to do so. Tracing can adversely affect performance.

**Default:** Tracing is turned off.

**Example:** environment = {AOPTRACEON -> 1}

**AOP_TRIM**

Indicates whether the transform creates trimmed AFP images or full-page AFP
images. Trimmed AFP images are smaller than full-page AFP images.
Therefore, AFP output files that contain trimmed AFP images are smaller and
can be transmitted more quickly over a network.

In contrast to full-page AFP images, trimmed AFP images do not include any
white space that surrounds the data on the page. The transform positions
trimmed AFP images on the page so that the data prints in the correct position
on the page. For example, if a page is 8 1/2 by 11 inches and has a 1 inch
margin on all sides:

- A trimmed AFP image is 6 1/2 x 9 inches. It is positioned at offset 1 inch (x),
  1 inch (y) on the page.
A full-page AFP image is 8 1/2 by 11 inches. It is positioned at offset 0 (x), 0 (y) on the page.

AFP documents print the same whether you specify AOP_TRIM = yes or AOP_TRIM = no. However, AFP overlays and AFP page segments typically print differently because trimmed AFP images are smaller than full-page AFP images. A page segment that contains a trimmed AFP image typically prints higher and to the left on a page. (The -t transform option determines the type of output. For example, -t pagesegment creates a page segment.)

Values are:

- **yes**: The transform creates trimmed AFP images (default).
- **no**: The transform creates full-page AFP images.

The V1 transforms always create full-page AFP images. To create full-page AFP images in V2, you must specify the AOP_TRIM=no environment variable.

**Tip:** In addition to the environment variables listed in this section, you can specify other environment variables. For example, you can specify the _CEE_RUNOPTS environment variable. For information, see "Changing Language Environment run-time options" on page 57.

**Examples -- Transform configuration file entries for the PDF to AFP and PostScript to AFP transforms**

This section shows sample transform entries in the Infoprint Server transform configuration file (aopxfd.conf) for the PDF to AFP and PostScript to AFP transforms.

**Specify a transform resource path:** This transform specifies a resource directory that your installation created to contain custom fonts. This transform does not create a transform class. Therefore, to use this transform, do not specify a transform class in the -c transform option.

```
transform ps2afp
    start-command = ps2afpd
    maximum-active = 2
    maximum-idle-time = 300  # 5 minutes
    minimum-active = 1
    environment = {  
        _BPX_JOBNAME -> PS2AFPD
        _CEE_DMPTARG -> .  # CEDumps in current working directory
        AOP_RESOURCE_PATH -> /etc/Printsrv/ps2afpv2/fonts
    }

;
```

**Trace the transform:** This transform entry traces transform jobs and writes the trace to the /var/Printsrv/xfd/ps2afp.#.d directory. This transform entry creates transform class "trace". To use this transform class, specify the class in the -c transform option as shown in these two examples:

```
pdf2afp -c trace -o myfile.afp myfile.pdf
lp -o "filter-options='-c trace'" -d myprinter myfile.pdf
```

```
transform ps2afp_trace
    start-command = ps2afpd
    maximum-active = 2
    maximum-idle-time = 300  # 5 minutes
    minimum-active = 1
    environment = {  
        _BPX_JOBNAME -> PS2AFPD
        _CEE_DMPTARG -> .  # CEDumps in current working directory
    }
```

56 IBM Infoprint Transforms to AFP V2.1 for z/OS
Changing Language Environment run-time options

The transform sets these run-time options for the Language Environment (LE):

- ALL31(ON)
- ANYHEAP(16K,8K,ANYWHERE,FREE)
- BELOWHEAP(8K,4K,FREE)
- DEPTHCONDLM(10)
- ERRCOUNT(0)
- HEAP(512K,512K,ANYWHERE,FREE)
- LIBSTACK(8K,4K,FREE)
- STACK(128K,128K,ANYWHERE,KEEP,512K,128K)
- STORAGE(NONE,NONE,NONE,8K)
- TERMTTHDACT(DUMP)
- THREADHEAP(8K,8K,ANYWHERE,KEEP)
- THREADSTACK(OFF)
- TRAP(ON,PIE)

If you need to change any of these options, you can specify a new value by setting the _CEE_RUNOPTS environment variable in the transform configuration file, aopxfd.conf.

For example, to change the ERRCOUNT value, specify this environment variable:

_CEE_RUNOPTS -> 'ERRCOUNT(4)'

Guideline: Do not specify smaller initial allocation sizes in the ANYHEAP, HEAP, STACK, and THREADSTACK options. Setting smaller values can cause severe performance degradation.

For more information, see:

- "Specifying transform options" on page 50
- z/OS XL C/C++ Programming Guide

Starting Infoprint Server with sufficient memory

The region size available for Infoprint Server must be at least 10M larger than the number of bytes specified in the -m option in the transform configuration file. For information about the -m option, see [Specifying transform options on page 50].

The default for the -m option is 32M. Therefore, the minimum region size is 42MB. However, IBM recommends a region size of 256 MB or more so that you can transform large or complex data streams.

To make sure that sufficient memory is available when you start the transform:

- In the AOPSTART procedure, specify a region size of at least 256 MB in the REGION parameter on the EXEC statement. If the REGION parameter is not specified, the default region size defined for your installation is used.
- Make sure the maximum address space size for Infoprint Server is at least 256 MB.
You can set the system-wide maximum address space size in the BPXPRMxx member or with the SETOMVS command.

**Examples:**
- This statement in the BPXPRMxx member sets the maximum region size to 256 MB:
  ```
  MAXASSIZE(268435456) /* 256*1024*1024 = 256MB */
  ```
- This command sets the maximum region size to 256 MB:
  ```
  SETOMVS MAXASSIZE=268435456
  ```
- This command checks the MAXASSIZE value from the operator console:
  ```
  domvs,o
  ```

You can set the maximum address space for Infoprint Server higher than the system-wide maximum address in the ASSIZEMAX parameter of the RACF ADDUSER and ALTUSER command for the user that starts Infoprint Server. The ASSIZEMAX value overrides the MAXASSIZE value.

If you enter the `aopstart` command from the z/OS UNIX command line during a TSO session, the SIZE parameter on the TSO/E LOGON panel determines the maximum region size for an address space. Specify a SIZE parameter of at least 256 MB.

- The z/OS IEFUSI user exit can modify the region size of an address space. IBM strongly discourages you from altering the region size of address spaces in the OMVS subsystem category. For more information about the IEFUSI exit, see [z/OS MVS Installation Exits](https://www.ibm.com/support/docview.wss?uid=swg27026233).

### Setting up security

Security checking done in the transform requires that the user identifier (UID) of the executable file for the transform, `ps2afpd`, not be 0 (zero). When it is installed, file `ps2afpd` has a UID of 0. Therefore, you must change the owner of the file. The new owner must have a UID that is not 0 and not the default UID. Also, the set-user-ID flag for the file must be turned on.

First use the Resource Access Control Facility (RACF), or another program that follows system authorization facility (SAF) protocol, to create a user and group profile for the owner of `ps2afpd`. Then, change the owner of `ps2afpd` and turn on the set-user-ID flag.

**Steps for establishing security:**

1. Define a group to RACF.
   - The group profile must have an OMVS segment and a group identifier (GID). You can use any group name. IBM recommends that you do not give this group any authority to the z/OS file system.
   - For example, this RACF command defines group NOGROUP. For `nogroup-gid`, specify an integer that is different from other GIDs in your installation:
     ```
     ADDGROUP (NOGROUP) OMVS(GID(nogroup-gid))
     ```

2. Define a user to RACF as a z/OS UNIX user.
   - This user will be the owner of `ps2afpd`. The transform, as well as PostScript jobs being transformed, run with the UID of this user. For complete information about how to define z/OS UNIX users to RACF, see [z/OS UNIX System Services Planning](https://www.ibm.com/support/docview.wss?uid=swg27026233).
The user profile must have an OMVS segment. Its UID must (1) not be 0 and (2) not be the default UID, which is defined in the BPX.DEFAULT.USER profile in the RACF FACILITY class. You can use any user name. For example, you can use NOBODY.

IBM recommends that you do not give this user authority to the z/OS file system. However, if any PostScript jobs to be transformed require access to certain files, you can give this user access to the required files or connect this user to another group (or groups) that has access to the required files.

For example, this RACF command defines user NOBODY. For nobody-uid, specify an integer that is different from other UIDs in your installation:

```
ADDUSER (NOBODY) OMVS(UID(nobody-uid))
```

3. Connect the user to the group.

Connect the user defined in step 2 to the group defined in step 1. For example, this RACF command connects user NOBODY to the NOGROUP group:

```
CONNECT (NOBODY) GROUP(NOGROUP)
```

4. Switch to an effective UID of 0:

```
su
```

**Tip:** To use the `su` command, you must be permitted to the BPX.SUPERUSER profile in the FACILITY class in RACF.

5. Assign the user as the owner of file `ps2afpd`.

Use the `chown` command to assign the user defined in step 2 as the owner of `ps2afpd`. For example, type this command on the z/OS UNIX command line to assign user NOBODY as the owner:

```
chown NOBODY /usr/lpp/Printsrv/bin/ps2afpd
```

6. Turn the set-user-ID flag on for file `ps2afpd`.

The `chown` command turns off the set-user-ID flag. Therefore, use the `chmod` command to turn this flag on again. For example, type this command on the z/OS UNIX command line:

```
chmod u+s /usr/lpp/Printsrv/bin/ps2afpd
```

7. If you switched to an effective UID of 0 in step 4, switch back to your own UID:

```
exit
```

After doing these steps, you can use the `ls` command to list the owner of `ps2afpd` and to verify that the set-user-ID flag is on. For example, type on the z/OS UNIX command line:

```
ls -l /usr/lpp/Printsrv/bin/ps2afpd
```

Assuming that you assigned user NOBODY as the owner of `ps2afpd`, output from the `ls` command should look like this:

```
-rws------ 1 NOBODY NOGROUP ... /usr/lpp/Printsrv/bin/ps2afpd
```
The lowercase letter s in the owner permissions section indicates that the set-user-ID flag is on and that the owner has permission to execute the file.

For more information about RACF, see *z/OS Security Server RACF Security Administrator's Guide*. For more information about the *chown*, *chmod*, and *ls* commands, see *z/OS UNIX System Services Command Reference*.

## Adding fonts

The PDF to AFP and PostScript to AFP transforms provide fonts in the `/usr/lpp/Printsrv/ps2afpv2/fonts` directory. If the PDF and PostScript files you transform use other fonts, you can add the fonts to the transforms. You can add these types of fonts:

- Type 0, 1, 3, 4, and 42 fonts
- MultiMaster fonts

### Rules:

- Fonts must be in ASCII representation. Postscript font files in both PFA and PFB format are supported.
- The font file name can have a suffix. However, a suffix is not required.
- If the font file name is not exactly the same as the font name, you must specify the font file name in the *Fontmap* file. (If the font file name is the same as the font name, the transform finds the font even if the font name is not in the *Fontmap* file.)
- The data in the *Fontmap* file must be in ASCII representation.

### Steps for adding fonts:

1. Create a directory for the fonts. Set the z/OS UNIX permissions so that the owner can read, write, and execute the directories, and everyone can read and execute them. For example:
   ```
   mkdir /etc/Printsrv/ps2afpv2
   chmod 755 /etc/Printsrv/ps2afpv2
   mkdir /etc/Printsrv/ps2afpv2/fonts
   chmod 755 /etc/Printsrv/ps2afpv2/fonts
   ```

2. Add fonts to the fonts directory created in step 1. Set the z/OS UNIX permissions so that the owner can read and write the font files, and everyone can read them. For example:
   ```
   chmod 644 /etc/Printsrv/ps2afpv2/fonts/*
   ```

3. (Optional) If the names of the font files are not the same as the font names, edit the *Fontmap* file. First, copy the file from directory `/usr/lpp/Printsrv/ps2afpv2/lib` to the fonts directory created in step 1. For example:
   ```
   cp /usr/lpp/Printsrv/ps2afpv2/lib/Fontmap /etc/Printsrv/ps2afpv2/fonts/Fontmap
   ```
   Then follow the instructions in the file to specify the names and file names of the fonts you added.

   **Tip:** The data in the *Fontmap* file must be in ASCII representation. To edit this file in EBCDIC on the z/OS system, you can use the *iconv* command to convert between ASCII and EBCDIC. These examples show how to use the *alias* command to create *a2e* and *e2a* commands that convert data between EBCDIC and ASCII code pages, and then use these commands to convert data in the *Fontmap* file:
a. Convert data in Fontmap from ASCII to EBCDIC and create file Fontmap.e:
   alias a2e="iconv -f iso8859-1 -t ibm-1047"
   a2e Fontmap > Fontmap.e

b. Edit file Fontmap.e.
c. Convert data in Fontmap.e from EBCDIC to ASCII and replace data in file Fontmap:
   alias e2a="iconv -f ibm-1047 -t iso8859-1"
   e2a Fontmap.e > Fontmap

4. Specify the directory that contains the fonts you added and the modified Fontmap file in the AOP_RESOURCE_PATH environment variable in the transform configuration file, aopxfd.conf. For example:
   environment = {AOP_RESOURCE_PATH -> /etc/Printsrv/ps2afpv2/fonts}

5. Restart the Transform Manager to pick up the changes to the Fontmap and aopxfd.conf files. For example, use the AOPSTOP and AOPSTART JCL procedures:
   START AOPSTOP,OPTIONS='-d xfd'
   START AOPSTART

Customizing the SAP to AFP transform

To customize the SAP to AFP transform, do the tasks listed in this table. Required tasks are required by all installations. Optional tasks are required only if the listed condition applies to your installation.

<table>
<thead>
<tr>
<th>Task</th>
<th>Condition</th>
<th>See page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting environment variables</td>
<td>Optional: To change default location of files</td>
<td>61</td>
</tr>
<tr>
<td>Installing multibyte conversion tables</td>
<td>Optional: To transform DBCS data</td>
<td>62</td>
</tr>
<tr>
<td>Customizing SAP to AFP configuration files</td>
<td>Optional: To change default files</td>
<td>63</td>
</tr>
</tbody>
</table>

Setting environment variables

This environment variable affects the behavior of the SAP to AFP transform. If you need to set this environment variable, set it both in the aopstart EXEC and in the /etc/profile file.

For information about how to edit the aopstart EXEC, see "Editing the aopstart EXEC" in z/OS Infoprint Server Customization.

AOP_SAP2AFP_RESOURCES

The directory that contains all of the SAP to AFP transform resources. You can specify only one directory name. If you installed Infoprint Server Transforms resources in the default directory, /usr/lpp/Printsrv/sap2afp, you do not need to set this environment variable.

Default: /usr/lpp/Printsrv/sap2afp
Installing multibyte conversion tables

To transform and print SAP R/3 data streams that contain multibyte special characters, such as data streams produced by Asian versions of the SAP R/3 system, you must install binary conversion tables for the code pages used by the SAP to AFP transform in the /usr/lib/nls/locale/uconvTable directory.

The z/OS UNIX uconvdef command can create the required conversion tables. You can use these source files in the /usr/lpp/Printsrv/sap2afp directory as input to the uconvdef command. These source files define the mapping between UCS-2 and multibyte code sets:

IBM-932-SAP2AFP.ucmap
Defines the mapping for the SAP R/3 8000 (Japanese) system code page. The transform uses code page IBM-932-SAP2AFP as the iconv source code page.

IBM-1030-SAP2AFP.ucmap
Defines the mapping for the IBM-1030-SAP2AFP code page. This mapping is based on IBM-1027.ucmap, with the addition of the 11 box drawing characters. To use the IBM-1030-SAP2AFP code page, customize the 80000000.tab configuration file.

IBM-1031-SAP2AFP.ucmap
Defines the mapping for the IBM-1031-SAP2AFP code page, which the transform uses as the default output code page. This mapping is based on IBM-290.ucmap, with the addition of the 11 box drawing characters. You can change the output code page in the 80000000.tab configuration file, described in "xxxx0000.tab configuration file" on page 73.

Steps for creating binary tables:

1. Switch to an effective UID of 0:
   su

   To use the z/OS UNIX su command, you must be permitted to the BPX.SUPERUSER FACILITY class profile in RACF.

2. Change to the /usr/lib/nls/locale/uconvTable directory:
   cd /usr/lib/nls/locale/uconvTable

3. Create binary conversion tables:
   uconvdef -f /usr/lpp/Printsrv/sap2afp/IBM-932-SAP2AFP.ucmap -v IBM-932-SAP2AFP
   uconvdef -f /usr/lpp/Printsrv/sap2afp/IBM-1030-SAP2AFP.ucmap -v IBM-1030-SAP2AFP
   uconvdef -f /usr/lpp/Printsrv/sap2afp/IBM-1031-SAP2AFP.ucmap -v IBM-1031-SAP2AFP

4. Set the p extended attribute for the binary conversion tables:
   extattr +p IBM-**-SAP2AFP

5. Change the access permissions:
   chmod 644 IBM-**-SAP2AFP
6. If you switched to an effective UID of 0 in step 1, switch back to your own user
   ID:
   exit

For more information about these z/OS UNIX commands, see [z/OS UNIX System
   Services Command Reference].

Customizing SAP to AFP configuration files
The SAP to AFP transform uses these configuration files:

barcode.tab
   Maps SAP OTF bar code names to the bar codes in Bar Code Object
   Content Architecture (BCOCA).

defcp.tab
   Maps the Open Systems EBCDIC 1047 code page to the code page
   associated with the ABAP coded fonts specified in pagedef.tab.

fonts.tab
   Maps the fonts used in the OTF data stream to AFP fonts.

image.tab
   Defines values used to print image data.

pagedef.tab
   For each SAP R/3 Format name, specifies the page definition, form
   definition, and ABAP coded fonts.

xxxx0000.tab
   Maps an SAP code page to an AFP code page.

The default configuration files are in the /usr/lpp/Printsrv/sap2afp directory. If you
choose to install the SAP to AFP configuration files in a different directory, you must
specify the new directory in environment variable AOP_SAP2AFP_RESOURCES.
All configuration files must be in the same directory.

barcode.tab configuration file
The barcode.tab configuration file contains a table that maps bar code names used
by SAP to the matching bar codes defined by the AFP Bar Code Object Content
Architecture (BCOCA).

You can specify these keywords and values in file barcode.tab:

BarCode = name
   This required keyword specifies the OTF bar code names
   (SAPBARCODE parameter of the BC OTF command). The
   maximum length of this field is 8 bytes. It can contain any value.

Type = nnn
   This required keyword specifies the AFP bar code type as defined
   in Data Stream and Object Architectures: Bar Code Object Content
   Architecture Reference for the BarCode Type parameter of the
   Barcode Data Descriptor structured field. This value can be any
decimal value between 0 and 999. The transform does not verify
that this value maps to a valid hexadecimal barcode type.

Mode=nnn
   This required keyword specifies the modifier byte in the Barcode
   Modifier parameter of the Barcode Data Descriptor structured
   field. Any numeric value between 0 and 999 is accepted and not
   verified.
Flag = [0 | 128]
  This required keyword controls the printing of the Human Readable Interface (HRI) character. Specify one of these values:
  0 Causes the HRI character to be printed
  128 Causes the HRI character not to be printed

ModWidth = nnn
  This optional keyword specifies the width of the narrowest defined bar code element (bar or space) in mils (that is, thousandths of an inch – 1/1000). Allowed values are 1 – 254.
  For bar code types that explicitly specify the module width, such as POSTNET and RM4SCC, this field is ignored.

  Default: The printer default ModWidth

Ratio = nnn
  This optional keyword specifies the ratio of the width of wide bar code elements to narrow bar code elements, when only two different size elements exist, that is, for a two-level bar code type. Express the ratio as a percentage. Allowed values are 100 – 500. However, the value should usually be between 200 and 300. For example: 200 represents a ratio of 2 to 1, and 250 represents a ratio of 2.5 to 1.
  Specify a value that is appropriate for the bar code type and for your printer. Many bar codes do not support ratio values, and other bar codes require that the ratio value fall within a specific range. If you specify a ratio value that is not appropriate for the printer, error messages are sent at printing time.
  For bar code types that explicitly specify the module width, such as POSTNET and RM4SCC, this field is ignored.

  Default: The default ratio for the bar code type.

Note: Verify any values you enter in this table. The transform does not verify values, and values that are not valid might result in errors.

Figure 4 on page 65 shows the default barcode.tab configuration file.
defcp.tab configuration file

The defcp.tab configuration file contains a table that maps the Open Systems EBCDIC 1047 code page to the code page associated with the ABAP coded fonts specified in the pagedef.tab file.

Figure 4 on page 65 shows the default defcp.tab file. The table in this file maps to output code page T1DBASE for use with coded fonts GT2B, GT5B, GT8B, and GB2B, which are specified in the default pagedef.tab file.

Table 6 on page 66 shows how the SAP to AFP transform maps ABAP box characters (called frame characters in SAP documentation) to the corresponding
code point in the output code page. The transform maps the ABAP characters to hex values X'00' through X'0A'. The table in file `defcp.tab` then maps these hex values to a code point. For example, `\G0` and `#462` are ABAP characters for the upper left box corner (called **down right** in SAP documentation). The transform maps these characters to X'00'. The table in file `defcp.tab` maps X'00' to ac, which is the code point for an upper left box corner in code page T1DBBASE.

Table 6. How SAP ABAP box characters map to code points

<table>
<thead>
<tr>
<th>ABAP frame characters</th>
<th>GOF ABAP frame characters</th>
<th>Description in SAP documentation</th>
<th>Description in defcp.tab</th>
<th>Mapped hex value</th>
<th>Code point (see note)</th>
</tr>
</thead>
<tbody>
<tr>
<td>\G0</td>
<td>#462</td>
<td>down right</td>
<td>upper left box corner</td>
<td>00</td>
<td>ac</td>
</tr>
<tr>
<td>\G1</td>
<td>#464</td>
<td>up right</td>
<td>lower left box corner</td>
<td>01</td>
<td>ad</td>
</tr>
<tr>
<td>\G2</td>
<td>#463</td>
<td>down left</td>
<td>upper right box corner</td>
<td>02</td>
<td>ae</td>
</tr>
<tr>
<td>\G2</td>
<td>#456</td>
<td>up left</td>
<td>lower right box corner</td>
<td>03</td>
<td>b6</td>
</tr>
<tr>
<td>\G4</td>
<td>#460</td>
<td>horizontal</td>
<td>center box bar horizontal</td>
<td>04</td>
<td>be</td>
</tr>
<tr>
<td>\G5</td>
<td>#461</td>
<td>vertical</td>
<td>center box bar vertical</td>
<td>05</td>
<td>df</td>
</tr>
<tr>
<td>\G6</td>
<td>#466</td>
<td>vertical right</td>
<td>left middle box side</td>
<td>06</td>
<td>bc</td>
</tr>
<tr>
<td>\G7</td>
<td>#467</td>
<td>vertical left</td>
<td>right middle box side</td>
<td>07</td>
<td>bd</td>
</tr>
<tr>
<td>\G8</td>
<td>#469</td>
<td>up horizontal</td>
<td>middle box bottom</td>
<td>08</td>
<td>b9</td>
</tr>
<tr>
<td>\G9</td>
<td>#468</td>
<td>down horizontal</td>
<td>middle box top</td>
<td>09</td>
<td>b8</td>
</tr>
<tr>
<td>\G:</td>
<td>#470</td>
<td>vertical horizontal</td>
<td>box intersection</td>
<td>0A</td>
<td>b7</td>
</tr>
</tbody>
</table>

**Note:** The code points shown in this column assume the T1DBBASE output code page. You can change the code points in the `defcp.tab` file.
Asian versions of SAP R/3 use special coding to represent double-byte special characters. Therefore, the `defcp.tab` file must specify the SAP R/3 system code page and the output code page conversion table. These attributes in the table specify the input and output code pages:

- **CONVERT FOR=xxxx**
  - `xxxx` is the SAP R/3 system code page.
- **CONVERT TO=yyyyyyyyyy**
  - `yyyyyyyyyy` is the output code page conversion table.

Figure 6 shows the Japanese conversion table in file `defcp.tab.japan`. To use this file, rename it to `defcp.tab`.

---

// defcp.tab
//-----------------------------------------------
// This file is used internally by sap2afp, as well as to convert ABAP data to linedata.
// SAP2AFP is configured to use IBM-932 as the iconv "From" value. This table sets the "To" value to IBM-1031.
// CONVERT FOR=8000
// CONVERT TO=IBM-1031-SAP2AFP

---

### fonts.tab configuration file
The `fonts.tab` configuration file contains a table that maps the fonts used in the SAP OTF data stream to AFP fonts. These font families are predefined with SAP R/3:

<table>
<thead>
<tr>
<th>Font Family</th>
<th>Font</th>
</tr>
</thead>
</table>

---

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Tip: JPMINCHO and DBMINCHO are different names for the same font.

A font named BARCODE must be defined for the HRI character of a bar code.

These attributes in the fonts.tab configuration file set the format of the fonts you use to print with R/3:

DefCodePage  Specifies the default SBCS code page used if no FC OTF command is given or if the requested font is not found in the fonts.tab table.

DefCharSet  Specifies the default SBCS character set used if no FC OTF command is given or if the requested font is not found in the fonts.tab table.

DBDefCodePage  Specifies the default DBCS code page used if no FC OTF command is given or if the requested font is not found in the fonts.tab table.

DBDefCharSet  Specifies the default DBCS character set used if no FC OTF command is given or if the requested font is not found in the fonts.tab table.

SBDefCodePage  Specifies the default SBCS code page used for half-width characters in DBCS fonts if no FC OTF command is given or if the requested font is not found in the fonts.tab table.

SBDefCharSet  Specifies the default SBCS character set used for half-width characters in DBCS fonts if no FC OTF command is given or if the requested font is not found in the fonts.tab table.

Font  Describes the font family (FONTFAMILY parameter of the FC OTF command). The maximum size is 8 bytes and content is not verified.

Size  Specifies the font size in 1/10 of a point (FONT SIZE parameter of the FC OTF command). The value must be numeric and is not verified.

Type  Defines the font type (BOLD and ITALIC parameter of the FC OTF command). Type=0 is normal, Type=1 is italic, Type=2 is bold, and Type=3 is italic bold. Any other value is not valid.

CodePage  Specifies the code page and requires a valid AFP code page name (8 bytes). The value is not verified. A name that is not valid can result in an error message.
** CharSet**: Specifies the AFP font character set. The content is not verified.

** CodedFont**: Specifies the AFP coded font. The content is not verified.

** DB**: Specifies whether the font is an SBCS font (DB=0) or a DBCS font (DB=1).

** SBCodePage**: Specifies the single-byte code page used for half-width characters in DBCS fonts. The value is not verified. A name that is not valid can result in an error message.

** SBCharSet**: Specifies the AFP single-byte font character set used for half-width characters in DBCS fonts. The content is not verified.

** SBCodedFont**: Specifies the AFP single-byte coded font used for half-width characters in DBCS fonts. The content is not verified.

If an SBCS font that matches the **Font**, **Size**, and **Type** values is not found, the code page and font character set from the **DefCodePage** and **DefCharSet** attributes are used and a warning message is displayed. If a DBCS font that matches the **Font**, **Size**, and **Type** values is not found, the code pages and font character sets from the **DBDefCodePage**, **SBDefCodePage**, **DBDefCharSet**, and **SBDefCharSet** attributes are used and a warning message is displayed.

The SAP device types **IBMAFP** and **IBMAFP3** support the predefined font families. These font families are also supported as IBM Expanded Core Fonts or IBM Japanese Fonts.

For ABAP listings, use the Letter Gothic Latin1 font provided with the AFP Font Collection V2 (program number 5648-B33). If you choose not to install the AFP Font Collection and plan to use the Gothic Text fonts provided with the IBM Compatibility Fonts, adjust the font names in the **pagedef.tab** configuration file.

[Figure 7 on page 70](#) and [Figure 8 on page 70](#) show sections of the **fonts.tab** configuration file.
Figure 7. Header and courier portions of default fonts.tab configuration file

Figure 8. Heisei Gothic portion of default fonts.tab configuration file

**image.tab configuration file**

The image.tab configuration file contains a table that defines values used to print image data. It contains these parameters:

- **DEFRES**
  - Specifies the default resolution used for printing image data if you do not specify a resolution in the printer definition and the job submitter does not specify a resolution in the -r option on the lp or sap2afp command. Valid values are 240, 300, 480, and 600.

- **Width**
  - Specifies the width of the dither matrix.

- **Height**
  - Specifies the height of the dither matrix.
Cell Specifies the values for the dither matrix.

Transform Specifies 256 grayscale correction values.

These are the image.tab files. To use one of these files, rename it to image.tab:

- image.tab - same as image.tab.85lr
- image.tab.141ap - 141 lines/inch AppleWriter grayscale emulation
- image.tab.141dt - 141 lines/inch Xerox DocuTech grayscale emulation
- image.tab.141lr - 141 lines/inch linear gamma correction
- image.tab.85ap - 85 lines/inch AppleWriter grayscale emulation
- image.tab.85dt - 85 lines/inch Xerox DocuTech grayscale emulation
- image.tab.85lr - 85 lines/inch linear gamma correction

Figure 9 shows the default image.tab configuration file.

```plaintext
// image.tab
// This file is used to determine the dither matrix and the
// grayscale correction values.
// Define the default output resolution
DEFRES = 600
// Define the dither matrix
Width = 78
Height = 78
Cell =
15 63 184 219 249 240 158 109 98 54 82 118 133 113 75 64
87 104 166 215 234 229 179 62 38 4 15 59 186 220 246 240
166 123 87 61 65 108 133 118 78 64 100 105 167 219 234 230
: : 28 73 193 223 253 247 199 76 31 8 20 93 148 156 203 178
136 126 144 186 201 155 151 90 43 24 28 75 199 222 254 251
196 79 31 7
//
// Grayscale correction values
//
Transform =
0
1
2
: : 248
252
255
```

Figure 9. Default image.tab configuration file

pagedef.tab configuration file

The pagedef.tab configuration file contains a table that maps SAP R/3 Format names to the names of AFP form definitions, AFP page definitions, and fonts. The SAP to AFP transform uses the form definition name when it transforms either SAP OTF or ABAP data. However, the transform uses the page definition and font names only for SAP ABAP data.

Every SAP R/3 document to be printed is associated with an SAP R/3 Format, for example the X_65_80 Format for ABAP data or the LETTER format for OTF data. You can also define user Formats to SAP R/3. If you define a user Format, you must add it to the pagedef.tab file.
A form definition lets you specify electronic overlays, portrait or landscape presentation mode, the paper source, simplex or duplex printing, and so on. By default, the transform uses the F1A10111 form definition, which specifies no electronic overlays, portrait presentation, the primary paper source, and duplex printing. You can change the form definition in the `pagedef.tab` file to another form definition that PSF provides. For information about form definitions that PSF provides, see [PSF for z/OS: User's Guide](#).

For example, to print in the landscape orientation you could define new user Formats to SAP R/3 (for example ZLAND for ABAP data and Z_65_255 for OTF data), and then map the new user Formats to form definition F1C10110 in the `pagedef.tab` file. F1C10110 is a form definition with landscape presentation mode specified that PSF provides.

File `pagedef.tab` contains these parameters:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Paper</strong></td>
<td>Specifies the name of the SAP R/3 format. This is the value of the OTF print option parameter <code>PJFORM</code> or <code>PJPAPER</code>. This value is not verified.</td>
</tr>
<tr>
<td><strong>FormDef</strong></td>
<td>Specifies the name of the form definition to be used for printing both OTF and ABAP reports. This value is not verified. However, an error results if PSF cannot find the form definition during printing.</td>
</tr>
<tr>
<td><strong>PageDef</strong></td>
<td>Specifies the name of the page definition to be used for printing ABAP reports. This value is not verified. However, an error results if PSF cannot find the page definition during printing.</td>
</tr>
<tr>
<td><strong>FontNorm</strong></td>
<td>Specifies the normal coded font used for printing ABAP data. The value is not verified.</td>
</tr>
<tr>
<td><strong>FontBold</strong></td>
<td>Specifies the bold coded font used for printing ABAP data. The value is not verified.</td>
</tr>
</tbody>
</table>

[Figure 10 on page 73](#) shows the default `pagedef.tab` configuration file.
xxx0000.tab configuration file
These configuration files contain tables that map characters of an individual SAP code page into an AFP code page:
Asian versions of SAP R/3 use special coding to represent double-byte special characters. Therefore, the 80000000.tab file must indicate the SAP R/3 system code page and the output code page. These parameters in the table specify the input and output code pages:

- CONVERT FOR=xxxx
  xxxx is the SAP R/3 system code page.
- CONVERT TO=yyyyyyyyyy
  yyyyyyyyy is the output code page conversion table.

Figure 11 shows the default 80000000.tab configuration file used for the SAP R/3 system code page 8000 (Japanese).

// Japanese
CONVERT FOR=8000
CONVERT TO=IBM-1031-SAP2AFP

Figure 11. Default 80000000.tab configuration file

Steps for customizing a configuration file

1. Create a new directory.

   IBM recommends that you do not change files that reside in the /usr/lpp/Printsrv directory. Therefore, create a new directory, for example, you can create directory /etc/Printsrv/sap2afp.

2. Copy all files to the new directory or use symbolic links. Edit the files.

   All configuration files must in the same directory. However, if you do not want to customize some files, you can use symbolic links to the /usr/lpp/Printsrv/sap2afp directory for those files. When editing the files, follow these rules:

### Table 7. SAP code page configuration files

<table>
<thead>
<tr>
<th>File name</th>
<th>SAP R/3 input code page</th>
<th>Description of input code page</th>
<th>AFP output code page</th>
<th>Description of output code page</th>
</tr>
</thead>
<tbody>
<tr>
<td>000000000000.tab</td>
<td>0000</td>
<td>EBCDIC ISO-1 (Latin 1)</td>
<td>T1V10500</td>
<td>International #5</td>
</tr>
<tr>
<td>012000000000.tab</td>
<td>0120</td>
<td>EBCDIC ISO-1 (Latin 1)</td>
<td>T1V10500</td>
<td>International #5</td>
</tr>
<tr>
<td>110000000000.tab</td>
<td>1100</td>
<td>ASCII ISO 8859/1 (Latin 1)</td>
<td>T1V10500</td>
<td>International #5</td>
</tr>
<tr>
<td>11000000000000.tab.japan</td>
<td>1100</td>
<td>ASCII ISO 8859/1 (Latin 1)</td>
<td>T1B00281</td>
<td>Bookmaster Japan (Latin)</td>
</tr>
<tr>
<td>400100000000.tab</td>
<td>4001 ²</td>
<td>OCR-A (ASCII)</td>
<td>T1000892</td>
<td>OCR-A</td>
</tr>
<tr>
<td>400400000000.tab</td>
<td>4004 ²</td>
<td>OCR-B (ASCII)</td>
<td>T1000893</td>
<td>OCR-B</td>
</tr>
<tr>
<td>800000000000.tab</td>
<td>8000</td>
<td>Japanese ISO Shift-JIS</td>
<td>IBM-1031-SAP2AFP</td>
<td>Japanese</td>
</tr>
</tbody>
</table>

1. To produce output in the T1B00281 Bookmaster Japan (Latin) code page, rename file 11000000000000.tab.japan to 11000000000000.tab.
2. The input OCR-A and the OCR-B code pages are equivalent to ISO-8859-1 with the special characters hook, fork, and chair.
• All tables can contain comments and empty lines. Start comments with // in column 1. Comments and empty lines are ignored.
• All table entries are case-sensitive.

3. Identify the new directory that contains the configuration files in the AOP_SAP2AFP_RESOURCES environment variable.
Chapter 4. Administering transforms

This chapter describes how Infoprint Server administrators can set up printer definitions in the Infoprint Server Printer Inventory so that Infoprint Server automatically transforms documents to AFP format before writing them to the JES spool or sending them to other print servers or e-mail destinations.

<table>
<thead>
<tr>
<th>Task</th>
<th>See page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Requesting the PCL to AFP transform</td>
<td>77</td>
</tr>
<tr>
<td>Requesting the PDF to AFP transform</td>
<td>79</td>
</tr>
<tr>
<td>Requesting the PostScript to AFP transform</td>
<td>82</td>
</tr>
<tr>
<td>Requesting the SAP to AFP transform</td>
<td>84</td>
</tr>
</tbody>
</table>

Requesting the PCL to AFP transform

This section describes how you can set up your printer definitions so that Infoprint Server automatically calls the PCL to AFP transform when it processes PCL documents.

PCL to AFP transform filter

In the printer definitions for AFP printers, you can specify the PCL to AFP transform filter and associate it with the PCL data format. (A filter is a program that modifies the input data before it is sent to the printer.) When you associate the transform filter with the PCL data format, Infoprint Server automatically calls the PCL to AFP transform when it processes a document with the PCL data format.

Table 8 shows the filter name and filter options that you can specify in the Filter field of a printer definition.

Table 8. PCL to AFP filter name and filter options

<table>
<thead>
<tr>
<th>Field name (attribute name)</th>
<th>Filter name</th>
<th>Filter options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter (filters)</td>
<td>pcl2afp.dll</td>
<td>[%filter-options] [-a imagetype] [-c transformclass]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[-p pagerange] [-t outputtype] [-T]</td>
</tr>
</tbody>
</table>

The filter options mean:

- **%filter-options**
  Causes options that are specified in the filter-options job attribute to be passed to the transform.
  You can type the %filter-options option in any position relative to the other filter options. If you specify filter options to the right of %filter-options, those options override the same options specified in the filter-options job attribute.

- **-c transformclass**
  Specifies the name of a transform class that is defined in the transform configuration file, aopxfd.conf. The name is case-sensitive. The job submitter can also specify this option in the filter-options job attribute.

- **-aptT**
  For a description of these options, see “pcl2afp—Transform PCL data to AFP data” on page 13.
Steps for editing printer definitions for the PCL to AFP transform

To edit printer definitions, use either Infoprint Server ISPF panels or the Printer Inventory Definition Utility (PIDU) program. This section describes how to use the ISPF panels. For information about the PIDU program, see "Using the PIDU program to manage the Printer Inventory" in z/OS Infoprint Server Operation and Administration.

Before you begin: You must be authorized to edit the Printer Inventory:

- z/OS V1R4: You must have READ access to the AOPADMIN profile in the RACF FACILITY class.
- z/OS V1R5 and higher: You must have UPDATE access to the AOP:ADMINISTRATOR profile in the RACF PRINTSRV class.

Steps for editing printer definitions:

1. (Optional) Create a Processing component. If you need to specify the PCL to AFP transform in a large number of printer definitions, a component can simplify administration. If you need to change your transform filter in the future, you can make the change in your Processing component.

2. On the Processing panel of either the printer definition or the component, select the PCL data format.
   Tip: In PSF printer definitions, also select the Line data, MO:DCA-P, and Text data formats. PSF can print line data and MO:DCA-P data on AFP printers, and Infoprint Server automatically converts text data to line data.

3. Next to the PCL data format, specify the pcl2afp.dll filter and filter options in the Filter field. Type the absolute path name if the filter is not in a directory named in the LIBPATH environment variable. For filter options, see "PCL to AFP transform filter" on page 77.

4. In PSF printer definitions, do not select the Resubmit for filtering field.

5. (Optional) If you created a Processing component, specify the name of the Processing component in the Component name field on the PSF printer definition panel. Do this in all printer definitions to which the transform applies. After you include a Processing component, check the Processing panel in the printer definition to make sure the transform is specified correctly. You might need to remove (space over) any filters that are specified on the Processing panel of the printer definition itself. If any filters are specified in the printer definition, the filters specified in the component are not used.

6. (Optional) On the Allocation panel, you can specify the name of the form definition, page definition, and fonts that PSF is to use when it prints AFP data that the transform creates. Job submitters can also specify these values in Infoprint Server job attributes. However, some job submission methods do not allow specification of job attributes.
Example -- ISPF Processing panel for the PCL to AFP transform

This ISPF panel shows how to specify the PCL to AFP transform in a printer definition for a PSF printer. Only a portion of the Processing panel is shown.

```
Processing

Printer definition name . afp-printer .
;
Supported data formats and associated filters:
Data format: Filter:
/ Line data ________________________________________________ (extend)
/ MO:DCA-P ______________________________________________ (extend)
/ PostScript ______________________________________________ (extend)
/ Text ____________________________________________________ (extend)
/ PCL pcl2afp.dll -c letter_300 %filter-options (extend)
/ PDF ____________________________________________________ (extend)
/ SAP ____________________________________________________ (extend)
/ XML ____________________________________________________ (extend)
/ Other ____________________________________________________ (extend)
   Resubmit for filtering
;
```

Explanation of fields:

- The **PCL** data format is selected because the **pcl2afp.dll** filter can transform PCL documents to AFP format. The transform options are:
  - The **-c** filter option causes the transform to use the **letter_300** transform class, which is defined in the transform configuration file.
    - Because the **-c** option is specified to the **left** of **%filter-options**, any **-c** option specified in the **filter-options** job attribute overrides the **-c** option specified in the printer definition.
  - The **%filter-options** filter option causes the transform to use transform options specified in the **filter-options** job attribute.
- The **Line data** and **MO:DCA-P** data formats are selected because PSF can print these data formats on AFP printers.
- The **Text** data format is selected because Infoprint Server automatically converts text data to line data when processing data for PSF printers.

Requesting the PDF to AFP transform

This section describes how you can set up your printer definitions so that Infoprint Server automatically calls the PDF to AFP transform when it processes PDF documents.

PDF to AFP transform filter

In the printer definitions for AFP printers, you can specify the PDF to AFP transform filter and associate it with the PDF data format. (A filter is a program that modifies the input data before it is sent to the printer.) When you associate the transform filter with the PDF data format, Infoprint Server automatically calls the PDF to AFP transform when it processes a document with the PDF data format.

[Table 9 on page 80](#) shows the filter name and filter options that you can specify in the **Filter** field of a printer definition.
Tip: The same ps2afp.dll filter transforms both PostScript and PDF documents to AFP format, but the filter options are different for each data format.

Table 9. PDF to AFP filter name and filter options

<table>
<thead>
<tr>
<th>Field name (attribute name)</th>
<th>Filter name</th>
<th>Filter options</th>
</tr>
</thead>
</table>

The filter options mean:

- **%filter-options**
  Causes options that are specified in the filter-options job attribute to be passed to the transform.
  You can type the %filter-options option in any position relative to the other filter options. If you specify filter options to the right of %filter-options, those options override the same options specified in the filter-options job attribute.

- **-c transformclass**
  Specifies the name of a transform class that is defined in the transform configuration file, aopxfd.conf. The name is case-sensitive. The job submitter can also specify this option in the filter-options job attribute.

- **-alprtwxT**
  For a description of these options, see "ps2afp—Transform PostScript data to AFP data" on page 24.

Steps for editing printer definitions for the PDF to AFP transform

To edit printer definitions, use either Infoprint Server ISPF panels or the Printer Inventory Definition Utility (PIDU) program. This section describes how to use the ISPF panels. For information about the PIDU program, see "Using the PIDU program to manage the Printer Inventory" in z/OS Infoprint Server Operation and Administration.

Before you begin: You must be authorized to edit the Printer Inventory:
- z/OS V1R4: You must have READ access to the AOPADMIN profile in the RACF FACILITY class.
- z/OS V1R5 and higher: You must have UPDATE access to the AOP.ADMINISTRATOR profile in the RACF PRINTSRV class.

Steps for editing printer definitions:

1. (Optional) Create a Processing component. If you need to specify the PDF to AFP transform in a large number of printer definitions, a component can simplify administration. If you need to change your transform filter in the future, you can make the change in your Processing component.

2. On the Processing panel of either the printer definition or the component, select the PDF data format.

Tip: In PSF printer definitions, also select the Line data, MO:DCA-P, and Text data formats. PSF can print line data and MO:DCA-P data on AFP printers, and Infoprint Server automatically converts text data to line data.
3. Next to the PDF data format, specify the ps2afp.dll filter and filter options in the Filter field. Type the absolute pathname if the filter is not in a directory named in the LIBPATH environment variable. For filter options, see "PDF to AFP transform filter" on page 79.

4. In PSF printer definitions, do not select the Resubmit for filtering field.

5. (Optional) If you created a Processing component, specify the name of the Processing component in the Component name field on the PSF printer definition panel. Do this in all printer definitions to which the transform applies. After you include a Processing component, check the Processing panel in the printer definition to make sure the transform is specified correctly. You might need to remove (space over) any filters that are specified on the Processing panel of the printer definition itself. If any filters are specified in the printer definition, the filters specified in the component are not used.

6. (Optional) On the Allocation panel, specify the name of the form definition, page definition, and fonts that PSF is to use when it prints AFP data that the transform creates. Job submitters can also specify these values in Infoprint Server job attributes. However, some job submission methods do not allow specification of job attributes.

**Example -- ISPF Processing panel for the PDF to AFP transform**

This ISPF panel shows how to specify the PDF to AFP transform in a printer definition for a PSF printer. Only a portion of the Processing panel is shown.

```
Processing
Printer definition name . afp-printer

Supported data formats and associated filters:
Data format:  Filter:
/ Line data  (extend)
/ MO:DCA-P  (extend)
/ PostScript  (extend)
/ Text  (extend)
/ PCL  (extend)
/ PDF ps2afp.dll %filter-options -r 300  (extend)
/ SAP  (extend)
/ XML  (extend)
/ Other  (extend)

Resubmit for filtering
```

Explanation of fields:
- The PDF data format is selected because the ps2afp2.dll filter can transform PDF documents to AFP format. The transform options are:
  - The %filter-options filter option causes the transform to use transform options specified in the filter-options job attribute.
- The -r option causes the transform to format the output for a 300-pel resolution printer.

Because the -r option is specified to the right of %filter-options, the transforms ignore the -r option specified in the filter-options job attribute.

- The Line data and MO:DCA-P data formats are selected because PSF can print these data formats on AFP printers.

- The Text data format is selected because Infoprint Server automatically converts text data to line data when processing data for PSF printers.

#### Requesting the PostScript to AFP transform

This section describes how you can set up your printer definitions so that Infoprint Server automatically calls the PostScript to AFP transform when it processes PostScript documents.

#### PostScript to AFP transform filter

In the printer definitions for AFP printers, you can specify the PostScript to AFP transform filter and associate it with the PostScript data format. (A filter is a program that modifies the input data before it is sent to the printer.) When you associate the transform filter with the PostScript data format, Infoprint Server automatically calls the PostScript to AFP transform when it processes a document with the PostScript data format.

Table 10 shows the filter name and filter options that you can specify in the Filter field of a printer definition.

Tip: The same ps2afp.dll filter transforms both PostScript and PDF documents to AFP format but the filter options are different for each data format.

**Table 10. PostScript to AFP filter name and filter options**

<table>
<thead>
<tr>
<th>Field name (attribute name)</th>
<th>Filter name</th>
<th>Filter options</th>
</tr>
</thead>
</table>

The filter options mean:

- **%filter-options**
  Causes options that are specified in the filter-options job attribute to be passed to the transform.

  You can type the %filter-options option in any position relative to the other filter options. If you specify filter options to the right of %filter-options, those options override the same options specified in the filter-options job attribute.

- **-c transformclass**
  Specifies the name of a transform class that is defined in the transform configuration file, aopxfd.conf. The name is case-sensitive. The job submitter can also specify this option in the filter-options job attribute.

- **-a lrtwxyT**
  For a description of these options, see "ps2afp—Transform PostScript data to AFP data" on page 24.
Steps for editing printer definitions for the PostScript to AFP transform

To edit printer definitions, use either Infoprint Server ISPF panels or the Printer Inventory Definition Utility (PIDU) program. This section describes how to use the ISPF panels. For information about the PIDU program, see "Using the PIDU program to manage the Printer Inventory" in z/OS Infoprint Server Operation and Administration.

Before you begin: You must be authorized to edit the Printer Inventory:
- z/OS V1R4: You must have READ access to the AOPADMIN profile in the RACF FACILITY class.
- z/OS V1R5 and higher: You must have UPDATE access to the AOP.ADMINISTRATOR profile in the RACF PRINTSRV class.

Steps for editing printer definitions:

1. (Optional) Create a Processing component. If you need to specify the PostScript to AFP transform in a large number of printer definitions, a component can simplify administration. If you need to change your transform filter in the future, you can make the change in your Processing component.

2. On the Processing panel of either the printer definition or the component, select the PostScript data format.
   Tip: In PSF printer definitions, also select the Line data, MO:DCA-P, and Text data formats. PSF can print line data and MO:DCA-P data on AFP printers, and Infoprint Server automatically converts text data to line data.

3. Next to the PostScript data formats, specify the ps2afp.dll filter and filter options in the Filter field. Type the absolute pathname if the filter is not in a directory named in the LIBPATH environment variable. For filter options, see "PostScript to AFP transform filter" on page 82.

4. In PSF printer definitions, do not select the Resubmit for filtering field.

5. (Optional) If you created a Processing component, specify the name of the Processing component in the Component name field on the PSF printer definition panel. Do this in all printer definitions to which the transform applies. After you include a Processing component, check the Processing panel in the printer definition to make sure the transform is specified correctly. You might need to remove (space over) any filters that are specified on the Processing panel of the printer definition itself. If any filters are specified in the printer definition, the filters specified in the component are not used.

6. (Optional) On the Allocation panel, specify the name of the form definition, page definition, and fonts that PSF is to use when it prints AFP data that the transform creates. Job submitters can also specify these values in Infoprint Server job attributes. However, some job submission methods do not allow specification of job attributes.
Example -- ISPF Processing panel for the PostScript to AFP transform

This ISPF panel shows how to specify the PostScript to AFP transform in a printer definition for a PSF printer. Only a portion of the Processing panel is shown.

```
Processing

Printer definition name . afp-printer
:
:

Supported data formats and associated filters:
Data format: Filter: (extend)
/ Line data | (extend)
/ MO:DCA-P | (extend)
/ PostScript ps2afp.dll %filter-options -r 300 | (extend)
/ Text      | (extend)
  - PCL     | (extend)
  - PDF     | (extend)
  - SAP     | (extend)
  - XML     | (extend)
  - Other   | (extend)
  - Resubmit for filtering
  :
```

Explanation of fields:

- The **PostScript** data format is selected because the ps2afp2.dll filter can transform PostScript documents to AFP format. The transform options are:
  - The %filter-options filter option causes the transform to use transform options specified in the filter-options job attribute.
  - The -r option causes the transform to format the output for a 300-pel resolution printer.
    Because the -r option is specified to the right of %filter-options, the transforms ignore the -r option specified in the filter-options job attribute.

- The **Line data** and **MO:DCA-P** data formats are selected because PSF can print these data formats on AFP printers.

- The **Text** data format is selected because Infoprint Server automatically converts text data to line data when processing data for PSF printers.

Requesting the SAP to AFP transform

This section describes how you can set up your printer definitions so that Infoprint Server automatically calls the SAP to AFP transform when it processes SAP documents.

SAP to AFP transform filter

In the printer definitions for AFP printers, you can specify the SAP to AFP transform filter and associate it with the PCL data format. (A filter is a program that modifies the input data before it is sent to the printer.) When you associate the transform filter with the SAP data format, Infoprint Server automatically calls the SAP to AFP transform when it processes a document with the SAP data format.

Table 11 on page 85 shows the filter name and filter options that you can specify in the Filter field of a printer definition.
Table 11. SAP to AFP filter name and filter options

<table>
<thead>
<tr>
<th>Field name (attribute name)</th>
<th>Filter name</th>
<th>Filter options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filter (filters)</td>
<td>sap2afp.dll</td>
<td>[%filter-options] [-p pagerange] ... [-r resolution] [-s]</td>
</tr>
</tbody>
</table>

The filter options mean:

%filter-options
Causes options that are specified in the filter-options job attribute to be passed to the transform.

You can type the %filter-options option in any position relative to the other filter options. If you specify filter options to the right of %filter-options, those options override the same options specified in the filter-options job attribute.

-prs For a description of these options, see "sap2afp—Transform SAP OTF or ABAP data to AFP data" on page 32.

Steps for editing printer definitions for the SAP to AFP transform

To edit printer definitions, use either Infoprint Server ISPF panels or the Printer Inventory Definition Utility (PIDU) program. This section describes how to use the ISPF panels. For information about the PIDU program, see "Using the PIDU program to manage the Printer Inventory" in z/OS Infoprint Server Operation and Administration.

Before you begin: You must be authorized to edit the Printer Inventory:
- z/OS V1R4: You must have READ access to the AOPADMIN profile in the RACF FACILITY class.
- z/OS V1R5 and higher: You must have UPDATE access to the AOP:ADMINISTRATOR profile in the RACF PRINTSRV class.

Steps for editing printer definitions:
1. (Optional) Create a Processing component. If you need to specify the SAP to AFP transform in a large number of printer definitions, a component can simplify administration. If you need to change your transform filter in the future, you can make the change in your Processing component.

2. On the Processing panel of either the printer definition or the component, select the SAP data format.
  Tip: In PSF printer definitions, also select the Line data, MO:DCA-P, and Text data formats. PSF can print line data and MO:DCA-P data on AFP printers, and Infoprint Server automatically converts text data to line data.

3. Next to the SAP data format, specify the sap2afp.dll filter and filter options in the Filter field. Type the absolute pathname if the filter is not in a directory named in the LIBPATH environment variable. For filter options, see "SAP to AFP transform filter" on page 84.

4. In PSF printer definitions, do not select the Resubmit for filtering field.
5. (Optional) If you created a Processing component, specify the name of the Processing component in the Component name field on the PSF printer definition panel. Do this in all printer definitions to which the transform applies. After you include a Processing component, check the Processing panel in the printer definition to make sure the transform is specified correctly. You might need to remove (space over) any filters that are specified on the Processing panel of the printer definition itself. If any filters are specified in the printer definition, the filters specified in the component are not used.

**Tip:** The SAP to AFP transform determines the appropriate form definition, page definition, and fonts to use from its own configuration files and overrides any form definition, page definition, and fonts you specify on the Allocation panel or that job submitters specify.

**Example -- ISPF Processing panel for the SAP to AFP transform**

This ISPF panel shows how to specify the SAP to AFP transform in printer definition for a PSF printer. Only a portion of the Processing panel is shown.

```
Processing
Printer definition name . afp-printer
...
Supported data formats and associated filters:
Data format: Filter:
/ Line data __________________________ (extend)
/ MO:DCA-P __________________________ (extend)
_ PostScript __________________________ (extend)
/ Text ________________________________ (extend)
_ PCL ________________________________ (extend)
_ PDF ________________________________ (extend)
/ SAP ________________________________ (extend)
_ XML ________________________________ (extend)
_ Other ______________________________ (extend)
__ Resubmit for filtering
...
```

**Explanation of fields:**

- The **SAP** data format is selected because the *sap2afp2.dll* filter can transform SAP documents to AFP format. The transform options are:
  - The *%filter-options* filter option causes the transform to use transform options specified in the *filter-options* job attribute.
  - The *-r* option causes the transform to format the output for a 300-pel resolution printer. Because the *-r* option is specified to the right of *%filter-options*, the transforms ignore the *-r* option specified in the *filter-options* job attribute.
- The **Line data** and **MO:DCA-P** data formats are selected because PSF can print these data formats on AFP printers.
- The **Text** data format is selected because Infoprint Server automatically converts text data to line data when processing data for PSF printers.
Chapter 5. Diagnosing errors

This chapter describes the diagnostic facilities that the transforms provide.

Submitting APARs

Report any difficulties using the transforms to your IBM Support Center. If an APAR is required, the Support Center can tell you where to send the required diagnostic information.

When submitting an APAR, use the component ID 5655N6001.

Using error messages

If problems are encountered during program operation, the transforms produce error messages.

The error messages might print on a separate message page with the output, might be saved in the transform’s stderr file, or might print on the user or system console, depending on the severity and nature of the error, according to these guidelines:

- **Print formatting errors:**
  These error messages describe print formatting or job-related errors. The transforms, except for the SAP to AFP transform, usually write these messages in the output file on a page after the transformed output.

- **Transform errors:**
  These error messages indicate problems with the transforms or with transform configuration, so they are directed to the system administrator. The transforms, except for the SAP to AFP transform, write these messages to the transform’s stderr file.

  **Tip:** For some error conditions, the PCL to AFP transform writes more detailed error messages to the transform’s stderr file when tracing is turned on. If you have trouble diagnosing a problem, you can turn tracing on and look for additional messages in the stderr file.

- **Font-substitution messages:**
  These messages indicate that the transform used substitute fonts. The transforms, except for the SAP to AFP transform, write font-substitution messages to the transform’s stderr file.

  **Tip:** To see these messages when you run the PDF to AFP or PostScript to AFP transform, make sure that the AOP_FONT_SUBSTITUTION_MESSAGES environment variable is either not set or is set to yes.

The SAP to AFP transform writes its error messages to the stdout file. If the job was submitted with the lp or sap2afp command, stdout output usually appears on the user’s console, unless the user redirected the stdout file. If the job was submitted with the AOPPRINT JCL procedure or the AOPBATCH utility program, stdout output is sent to the file specified in the JCL to receive standard output. If the job was submitted using another method, for example, with the SAP R/3 GUI, the transform directs error messages to the system console.
Finding the transform stderr file

You can find a transform's stderr file in the directory named base-directory/xfd, where base-directory is determined by the value of the base-directory attribute in the Infoprint Server configuration file, aopd.conf. The default base directory is named /var/Printsrv.

The stderr file-naming convention is: transform[_class]#.stderr

- **transform** Specifies the transform name, which is defined in the Infoprint Server Transform Manager configuration file, aopxfd.conf. For example, pcl2afp.

- **class** Specifies the transform class, which is specified in the -c option when the transform is called. Transform classes are defined in the Infoprint Server Transform Manager configuration file, aopxfd.conf.

- **#** A unique number that the transform assigns. This number is incremented each time a new transform is started.

**Tip:** To read the transform's stderr file, you must be a member of the AOPADMIN group. For information about how to establish security for Infoprint Server administrators, see [z/OS Infoprint Server Customization.](#)

Running traces

This section describes how to run a trace of a transform. The service representative in the IBM Support Center might ask you to run a trace to aid in diagnosing a problem. If so, the representative will tell you how and where to send the trace information. You do not have to interpret the trace. Send it to your service representative.

Tracing the PCL to AFP, PDF to AFP, and PostScript to AFP transforms

This section describes how to run a trace of the PCL to AFP, PDF to AFP, and PostScript to AFP transforms. Tracing can slow performance considerably. Turn tracing on for only as long as necessary to capture the error.

**Tip:** For some error conditions, the PCL to AFP transform writes more detailed error messages to the transform's stderr file when tracing is turned on. If you have trouble diagnosing a problem, you can turn tracing on and look for additional messages in the stderr file.

To trace transforms, you can either specify the -T transform option or set the AOPTRACEON environment variable:

- Specify the -T option to trace a specific transform request, or to trace all transform requests for a specific printer.
- Set the AOPTRACEON environment variable to trace all transform requests, or to trace all transforms that use a transform class.

You can specify the -T option in these ways:

- On the pcl2afp, pdf2afp, or ps2afp command.
- In the filter-options job attribute on a print command. The lp command, the Infoprint Port Monitor for Windows, and some other print commands let job submitters specify Infoprint Server job attributes.
In the Filter options field in a printer definition in the Printer Inventory.

When you request a trace using either the -T option or the AOPTRACEON environment variable, the transform writes the trace in a file in the directory specified in the AOPTRACEDIR environment variable or to the default directory (/var/Printsrv/trace). One trace file can contain trace information for multiple print jobs because each instance of a transform appends trace information to the same trace file. The transform's stderr file contains the name of the trace file.

These environment variables in the Infoprint Server transform configuration file, aopxfd.conf, turn tracing on and specify where the trace is written:

**AOPTRACEON**

Set this variable to any value to turn tracing on. The transform traces all transform requests that use this transform class. Any value turns tracing on. To turn tracing off, do not specify this environment variable.

**Default:** Tracing is turned off.

**Example:** environment = {AOPTRACEON -> 1}

**AOPTRACEDIR**

Specify the full path name of the directory where the transform writes trace information. You can specify the same directory for different transform classes. The name of the trace file identifies the transform and transform class, and contains a timestamp.

This directory must already exist. If the directory does not exist, the transform writes trace information to the transform's stderr file. For information about how to find the stderr file, see "Finding the transform stderr file" on page 88.

**Default:** AOPTRACEDIR -> /var/Printsrv/trace

**Examples:**

environment = {AOPTRACEDIR -> /var/Printsrv/xfd}

environment = {AOPTRACEDIR -> .}

For an example of a transform entry in the transform configuration file that specifies these variables, see "Trace the transform" on page 56.

**Tip:**

Using AOPTRACEDIR -> . has these benefits and limitations:

- The trace is recorded in the transform's working directory. This keeps the trace closely associated with any other items that might be produced when the job runs (for example, a dump). Because the trace might contain sensitive information, this keeps the trace in a secure location.
- The trace is automatically cleaned up when you restart the Transform Manager.
- However, when you restart the Transform Manager, the transform's working directory and its contents are deleted. Be sure to look in all the active transform directories to find the trace that you are interested in.

**Examples of tracing transforms:**

1. To request a trace by specifying the -T option on a transform command:

   ```
   pdf2afp -o outputfile -T myfile.pdf
   ```
2. To request a trace by specifying the -T option on a transform command when you use the AOPBATCH program:

```
//AOPBATCH JOB 
//TRANSFRM EXEC PGM=AOPBATCH,PARM=’/ps2afp -T -o //DD:OUTPUT DD:INPUT' 
//INPUT DD DSN=HLQ.INPUT.PS,DISP=SHR 
//OUTPUT DD DSN=HLQ.OUTPUT.AFP,DISP=(NEW,CATLG,DELETE), 
// DCB=(RECFM=VBM,LRECL=32756,BLKSIZE=32760),SPACE=(CYL,(1,1)) 
//STDOUT DD SYSOUT=* 
//STDERR DD SYSOUT=*  
```

Note: To continue the PARM parameter:
- Extend the parameter to column 71. Do not code an apostrophe in column 71.
- Code // in columns 1 and 2 of the following statement.
- Continue the parameter in column 16 of the following statement even if this splits the parameter.

3. To request a trace by specifying the -T option on an lp command:

```
lp -d myprinter -o "filter-options='-T'" myfile.pdf  
```

4. To request a trace by specifying the -T option in a printer definition:

```
Processing  
Supported data formats and associated filters:  
Data format: Filter:  
/ PostScript ps2afp.dll %filter-options -T___________ (extend)  
/ PCL pcl2afp.dll %filter-options -T___________ (extend)  
/ PDF pdf2afpdf.dll %filter-options -T___________ (extend)  
```

5. To submit a transform request to a transform class that specifies the AOPTRACEON environment variable. If the administrator defined a transform class called “trace” in the Infoprint Server transform configuration file (aopxfd.conf), use these commands to submit a trace request to it.

```
pdf2afp -c trace -o myfile.afp myfile.pdf  
lp -o "filter-options='-c trace'" -d myprinter myfile.pdf  
```

**Tracing the SAP to AFP transform**

This section describes how to run a trace of the SAP to AFP transform.

You can run a trace in these ways:

**In a printer definition:**
Use the Filter field in a printer definition.

**In the filter-options job attribute:**
Use the filter-options job attribute specified with the lp command, or use any other job-submission method that lets you specify Infoprint Server job attributes (such as when you submit a job using the Infoprint Port Monitor).

**On the transform command:**
Use the sap2afp command.

With each of these methods, you can use the trace option that is explained in "Trace option" on page 91.

For examples, see "Examples of running traces" on page 91.
Trace option
This trace option lets you request a trace of the SAP to AFP transform:

-t Requests that the transform produce a trace in file sap2afp.trc in the transform's current working directory. If the trace file does not exist, it is created. Trace output is appended to any existing trace output.

If the file was submitted with the \texttt{lp} or \texttt{sap2afp} command, the transform's current working directory is the current working directory of the user who entered the command. If the print request was submitted using another method, for example, with the SAP R/3 GUI, the current working directory is the Infoprint Server base directory. The default base directory is \texttt{/var/Printsrv}. However, the default base directory can be changed in the \texttt{base-directory} attribute in the Infoprint Server configuration file, \texttt{aopd.conf}.

Examples of running traces
1. To request a trace of the SAP to AFP transform in the Processing section of a printer definition and write the trace to file \texttt{/var/Printsrv/sap2afp.trc}:

   
   Processing
   :
   :
   Supported data formats and associated filters:
   Data format: Filter:
   
   Line data
   MOD:DCAP
   PostScript
   Text
   PCL
   PDF
   / SAP sap2afp.dll -t
   XML
   Other
   :
   :

2. To request a trace on the \texttt{lp} command (printer definition \texttt{myprinter} specifies the SAP to AFP transform):

   lp -d myprinter -o "filter-options='-t'" myfile.sap

3. To request a trace on the \texttt{sap2afp} command:

   sap2afp -d myprinter -t myfile.sap
Chapter 6. Messages

This chapter describes the messages that the transforms produce.

For information about all the messages from Infoprint Server, including messages that are related to transforms, see [z/OS Infoprint Server Messages and Diagnosis](#).

Message format

The messages have this format:

\[ \text{AOP}nnnnt \]

**AOP** Identifies messages from Infoprint Server

**nnn** The message number

**t** One-character type code:

<table>
<thead>
<tr>
<th>Type code</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>An error occurred.</td>
</tr>
<tr>
<td>I</td>
<td>Information message.</td>
</tr>
<tr>
<td>W</td>
<td>A warning situation occurred.</td>
</tr>
</tbody>
</table>

**message_text**

The text of the message.

Messages

**AOP2001E** An error was encountered while attempting to allocate \( n \) bytes for \( \text{object} \).

**Explanation:** Memory allocation error. The SAP to AFP transform program cannot allocate sufficient memory to do \( \text{procedure} \).

**System action:** The request was not completed.

**User response:** Increase the address space memory allocation. Retry the request. If the error continues to occur, notify your system programmer.

**System programmer response:** Increase the user's memory allocation. For more information, see "Customizing the SAP to AFP transform" on page 61.

**Problem determination:** Not applicable.

**Source:** Infoprint Transforms to AFP for z/OS

**Module:** Not applicable.

**Routing code:** Not applicable.

**Descriptor code:** Not applicable.

**Automation:** Not applicable.

**AOP2005E** An invalid OTF command \( \text{command} \) was found in line \( \text{linenumber} \) in the SAP file.

**Explanation:** The SAP to AFP transform encountered an unrecognized SAP OTF command on line \( \text{linenumber} \) in the SAP file.

In the message text, \( \text{command} \) is the SAP command that is not valid.

**System action:** The request was not completed.

**User response:** Verify the validity of your SAP OTF file. If SAP OTF file is valid, notify your system programmer.

**System programmer response:** Contact an IBM service representative.

**Problem determination:** Not applicable.

**Source:** Infoprint Transforms to AFP for z/OS

**Module:** Not applicable.

**Routing code:** Not applicable.

**Descriptor code:** Not applicable.

**Automation:** Not applicable.
1. Check the configuration environment variable AOP_SAP2AFP_RESOURCES value. It must specify the SAP to AFP transform resources directory.

2. Check that the file exists and that the user has read permission for the file. (The user is the person who started Infoprint Server or who entered a command such as lp or sap2afp.) The user might not have the required permissions for the file or the directory containing the file. The user must have r (read) and x (execute) permissions for the directory that contains the file, and r (read) permission for the file.

3. Contact your system programmer.

System programmer response: Verify that file file is installed. For more information, see "Customizing the SAP to AFP transform" on page 61.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Routing code: Not applicable.

Descriptor code: Not applicable.

Automation: Not applicable.

AOP2007E An error was found in closing file file.

Explanation: The SAP to AFP transform cannot close file file.

System action: The request was not completed.

User response: Notify your system programmer.

System programmer response: Contact an IBM service representative.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Module: Not applicable.

Routing code: Not applicable.

Descriptor code: Not applicable.

Automation: Not applicable.

AOP2008E An error was found while processing file file.

Explanation: The SAP to AFP transform detected an error while processing file file.

System action: The request was not completed.

User response: Notify your system programmer.

System programmer response: Contact an IBM service representative.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Module: Not applicable.

Routing code: Not applicable.

Descriptor code: Not applicable.

Automation: Not applicable.

AOP2009E A keyword keyword is missing from line linenumber in file file.

Explanation: A required keyword is missing from file file. The keyword specifies information about the printing of your file.

System action: The request was not completed.

User response: Notify your system programmer.

System programmer response: See "Customizing the SAP to AFP transform" on page 61 and sample files for keyword keyword for keyword usage and syntax.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Module: Not applicable.

Routing code: Not applicable.

Descriptor code: Not applicable.

Automation: Not applicable.

AOP2010E A keyword keyword is missing from file file.

Explanation: A required keyword is missing from file file. The keyword specifies a processing default.

System action: The request was not completed.

User response: Notify your system programmer.

System programmer response: keyword is a required keyword. For information about file file for keyword keyword usage and syntax, see "Customizing the SAP to AFP transform" on page 61.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Module: Not applicable.

Routing code: Not applicable.

Descriptor code: Not applicable.

Automation: Not applicable.

AOP2011E An invalid line linenumber was found in file file.

Explanation: Line linenumber in file file contains incorrect syntax.

System action: The request was not completed.

User response: Notify your system programmer.
System programmer response: See “Customizing the SAP to AFP transform” on page 61 and sample files for the syntax of line linenumber in file file.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Module: Not applicable.

Routing code: Not applicable.

Descriptor code: Not applicable.

Automation: Not applicable.

AOP2012E An invalid value was found for keyword at line linenumber in file file.

Explanation: Keyword keyword has been specified with an incorrect value.

System action: The request was not completed.

User response: Notify your system programmer.

System programmer response: See “Customizing the SAP to AFP transform” on page 61 and sample files for keyword keyword usage and syntax.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Module: Not applicable.

Routing code: Not applicable.

Descriptor code: Not applicable.

Automation: Not applicable.

AOP2013E Input line linenumber is too long in file file.

Explanation: The SAP to AFP transform read an input line that is more than 500 bytes long, or contains extra characters at the end of the line.

System action: The request was not completed.

User response: If file file is an ABAP format input file, check line linenumber for correct syntax.

System programmer response: If file file is a SAP to AFP configuration file (*.tab), check line linenumber for extra characters at the end of the line. For information about customizing the SAP to AFP transform, see “Customizing the SAP to AFP transform” on page 61.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Module: Not applicable.

Routing code: Not applicable.

Descriptor code: Not applicable.

Automation: Not applicable.

AOP2014E Insufficient internal storage was available for x.

Explanation: While processing x, the internal SAP to AFP transform storage limits were exceeded. The value of x can be one of these: AFP fonts (fonts.tab), bar codes (barcode.tab), printer (printer.tab), page definition (pagedef.tab).

System action: The request was not completed.

User response: Notify your system programmer.

System programmer response: Contact an IBM service representative.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Module: Not applicable.

Routing code: Not applicable.

Descriptor code: Not applicable.

Automation: Not applicable.

AOP2015W A matching font name size type was not found, so font font was substituted.

Explanation: The SAP to AFP transform could not find fontname name, size size and type type, so font font was substituted. font is the default character set (single-byte) or coded font (double-byte) that was substituted.

System action: Processing of the file continues, with another font substituted.

User response: If the substituted font is acceptable, no response is necessary. Otherwise, ask the system programmer to configure fonts.tab to support the required font.

System programmer response: Configure the font definition file fonts.tab to support the missing font. For more information, see “Customizing the SAP to AFP transform” on page 61.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Module: Not applicable.

Routing code: Not applicable.

Descriptor code: Not applicable.

Automation: Not applicable.

AOP2016E A bar code matching barcode was not found.

Explanation: Bar code barcode was not found.

System action: The request is not completed.

User response: Notify your system programmer.
System programmer response: Install the missing bar code.

Problem determination: Not applicable.
Source: Infoprint Transforms to AFP for z/OS
Module: Not applicable.
Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

---

AOP2018E Line linenumber contains an invalid ABAP command command.

Explanation: The SAP to AFP transform encountered an unrecognized SAP ABAP command on line linenumber in the SAP file.

In the message text, command is the command that is not valid.

System action: The request is not completed.
User response: Verify the validity of your SAP ABAP file. If the SAP ABAP file is valid, notify your system programmer.

System programmer response: Contact an IBM service representative.

Problem determination: Not applicable.
Source: Infoprint Transforms to AFP for z/OS
Module: Not applicable.
Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

---

AOP2020E A format format was not found in file.

Explanation: The page definition file file does not contain format format.

System action: The request is not completed.
User response: Notify your system programmer.

System programmer response: Define format format in page definition file file. For more information, see "Customizing the SAP to AFP transform" on page 61.

Problem determination: Not applicable.
Source: Infoprint Transforms to AFP for z/OS
Module: Not applicable.
Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

---

AOP2022E Unknown conversion field value specified in file.

Explanation: Conversion table file file specifies an incorrect "CONVERT FROM" value value.

System action: The request is not completed.
User response: Notify your system programmer.

System programmer response: See "Customizing the SAP to AFP transform" on page 61 and sample files for valid conversion field values.

Problem determination: Not applicable.
Source: Infoprint Transforms to AFP for z/OS
Module: Not applicable.
Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

---

AOP2023E An error was encountered when trying to open iconv with conversion tables specified as table1 and table2.

Explanation: iconv could not be opened with SAP to AFP conversion tables table1 and table2.

System action: The request is not completed.
User response: Notify your system programmer.

System programmer response: Install iconv conversion tables table1 and table2. For more information, see "Customizing the SAP to AFP transform" on page 61.

Problem determination: Not applicable.
Source: Infoprint Transforms to AFP for z/OS
Module: Not applicable.
Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

---

AOP2024E Iconv failed, errno = number.

Explanation: iconv failed.

System action: The request is not completed.
User response: Notify your system programmer.

System programmer response: Use the iconv ERRNO number to diagnose the problem. For more information, see "z/OS XL C/C++ Run-Time Library Reference".

Problem determination: Not applicable.
Source: Infoprint Transforms to AFP for z/OS
Module: Not applicable.
Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

AOP2026W The format of the input document might not be valid for the transform.

Explanation: The data format might not be valid for the transform that the user requested on the z/OS UNIX command line. As a result, an error might occur during the transform. If an error occurs, the transform writes another error message.

Note: On occasion, this message is written even though the data format is valid and the transform can transform the document successfully.

System action: The transform continues.

User response: Resubmit the transform request if the document was not transformed successfully.

System programmer response: If the transform stderr file contains another error message from the transform, ask the user to make sure the input document contains a valid data format for the requested transform. For example, if the message is from the PostScript to AFP transform, make sure the input document contains valid PostScript data.

If the transform stderr file does not contain another error message from the transform, ignore this message because the transform was successful.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

AOP2060E Input filename is not valid SAP data.

Explanation: The SAP to AFP transform does not recognize the input data stream as a valid SAP data stream. The transform requires these strings of data (in either EBCDIC or ASCII representation) in the header of an SAP input data stream:

V01 or MAJOR=2
and
FORMAT=OTF or FORMAT=LIST

System action: The request is not completed.

User response: Make sure that you specified the name of the correct input file and that the header contains the required data.

System programmer response: None.

Problem determination: Not applicable.

Source: Infoprint Transforms to AFP for z/OS

Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

AOP2201E The effective UID of this program must not be 0.

Explanation: The Infoprint Server Transform Manager attempted to start a transform daemon. However, for security reasons, the Transform Manager requires that (1) the owner of the executable file for the transform not have a UID of 0 and (2) the set-user-ID flag for the file is turned on. The message contains the name of the executable file.

System action: The Infoprint Server Transform Manager does not start the transform daemon. The Transform Manager attempts to start other transform daemons configured in the transform configuration file, aopxfd.conf.

User response: Contact your system programmer.

System programmer response: Use the ls command to list the owner of the file and to verify that the set-user-ID flag is on:

```
ls -l /usr/lpp/Printsrv/bin/ps2afpd
```

Output from the ls command should look like this, assuming that the owning user name is NOBODY and that the owning group name is NOGROUP:

```
-rw------- 1 NOBODY NOGROUP ...
```
The lowercase letter s in the owner permissions section indicates that the set-user-ID flag is on and that the owner has permission to execute the file. Use the id command to determine the UID of the user.

If the user has a UID of 0, enter the z/OS UNIX chown command to change the owner of the file. For example, to change the owner of file ps2afpd to NOBODY, type:

    chown NOBODY /usr/lpp/Printsrv/bin-ps2afpd

If the set-user-ID flag is off, or if you entered the chown command, use the chmod command to turn on the set-user-ID flag. For example, to turn the flag on for file ps2afpd, type:

    chmod u+s /usr/lpp/Printsrv/bin-ps2afpd

For more information, see Customizing the PDF to AFP and PostScript to AFP transforms on page 50.

Problem determination: Not applicable.
Source: InfoPrint Transforms to AFP for z/OS
Module: Not applicable.
Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

AOP2500E  Font substitution information: date-time

Explanation: The PCL to AFP, PDF to AFP, or PostScript to AFP transform did not find one or more fonts that a document requested, so it substituted similar fonts. To determine the substitute fonts, the transform used a font-substitution algorithm that you cannot modify.

In the message text, date-time is the date and time the message was written.

The text that follows this message identifies the fonts that the document requested and the fonts that the transform substituted.

The AOP_FONT_SUBSTITUTIONMESSAGES environment variable determines whether the transform writes this message when it substitutes fonts in a document if no other errors occurred.
System action: The document is transformed without error.
User response: None.
System programmer response: In most cases, the substitute font results in acceptable output and no response is necessary. However, if the output is not acceptable, you might be able to add the original font to the transform. For information, see Adding fonts on page 60.

If you added a font to the transform and the transform still substitutes another font, make sure that you specified the correct name of the font directory in the AOP_RESOURCE_PATH environment variable in the transform configuration file, aopxfd.conf. For information, see Appendix B, "Environment variables," on page 109.

Problem determination: Not applicable.
Source: InfoPrint Transforms to AFP for z/OS
Module: Not applicable.
Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

AOP2501E  The transform attempted to convert the document to AFP format. The input data stream might not be valid.

Diagnostic information from transform transform follows.
**AOP2503I** The transform attempted to convert the document to AFP format. Trace information from transform `transform` follows.

**Explanation:** The diagnostic information that follows this message is from the transform. IBM can use this information to diagnose the transform problem. In the message text, `transform` is the name of the transform in the format: `transform_class.#`.

**System action:** Processing continues unless the AOP_FAIL_ON_ERROR environment variable is set to yes in the transform configuration file, `aopxfd.conf`.

**User response:** Use the diagnostic information to correct any data stream errors.

**System programmer response:** If no data stream error is found, contact an IBM service representative.

**Problem determination:** Not applicable.

**Source:** Infoprint Transforms to AFP for z/OS

**Module:** Not applicable.

**Routing code:** Not applicable.

**Descriptor code:** Not applicable.

**Automation:** Not applicable.

---

**AOP2504E** The transform initialization failed. Diagnostic information from transform `transform` follows.

**Explanation:** The transform could not be initialized. In the message text, `transform` is the name of the transform in the format: `transform_class.#`.

**System action:** The transform request was not completed.

**User response:** Notify your system programmer.

**System programmer response:** Contact an IBM service representative. Report the diagnostic information to IBM.

**Problem determination:** Not applicable.

**Source:** Infoprint Transforms to AFP for z/OS

**Module:** Not applicable.

**Routing code:** Not applicable.

**Descriptor code:** Not applicable.

**Automation:** Not applicable.

---

**AOP2505E** Not enough memory is available to transform the data stream. Increase the memory available to this transform in the Infoprint Server transform configuration file. Also, make sure the region size is large enough.

**Explanation:** The transform could not obtain enough memory to convert the data stream. The data stream might be large or complex.

**System action:** The transform request is not completed. No output is produced.

**User response:** Notify your system programmer. After the problem is corrected, resubmit the transform or print request.

**System programmer response:** Increase the amount of storage available to the transform:

- Increase the amount of storage in the Infoprint Server transform configuration file, `aopxfd.conf`. Specify up to 1024M in the `-m` option of the entry for this transform. For example: `start-command="ps2afpd -m 1024M"

- Specify a region size that is at least 10M greater than the value in the `-m` option:
  - If you use the AOPSTART JCL procedure to start Infoprint Server, specify the region size in the REGION parameter of the EXEC statement.
  - If you issue the `aopstart` command from the z/OS UNIX command line during a TSO session, specify the region size in the SIZE option on the logon panel or logon procedure for the TSO user ID.

- Make sure the maximum address space size for Infoprint Server is at least 10M greater than the value in the `-m` option:
  - Check the MAXASSIZE value in the BPXPRMxx member of SYS1.PARMLIB. MAXASSIZE sets the system-wide maximum address space size. You can set MAXASSIZE dynamically with the SETOMVS command. You can check
MAXASSIZE from the operator console with this
Display command: d omvs,o

- Check the RACF ASSIZEMAX value for the user
  ID that starts Infoprint Server. ASSIZEMAX
  overrides the MAXASSIZE value. You can
  increase the ASSIZEMAX value on the RACF
  ALTUSER command.

- If you have IEFUSI exits that limit region sizes, make
  sure the limits in the IEFUSI exits do not apply to
  OMVS. Enter one of these commands:
  - If you do not want any exits to apply to OMVS:
    SETSMF SUBSYS(OMVS.NOEXITS)
  - If you need some exits to apply to OMVS:
    SETSMF SUBSYS(OMVS.EXITS(exits))

  In the EXITS parameter, specify the exits to apply
  to OMVS, but do not specify IEFUSI.

For more information about the IEFUSI exit, see z/OS
MVS Installation Exits.

Problem determination: Not applicable.
Source: Infoprint Transforms to AFP for z/OS
Module: Not applicable.
Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.

AOP2506W The transform converted the first page
of the input file to a page segment or
overlay because no page number was
specified in the -p option.

Explanation: The transform request specified the -t
pagesegment or -t overlay option to convert the input
file to an AFP page segment or overlay. The transform
can create an AFP page segment or overlay for only
one page in the input file. Because the transform
request did not identify which page in the input file to
use for the page segment or overlay, the transform used
the first page.

System action: The transform completed successfully.
User response: If the transform did not create a page
segment of overlay of the correct page, resubmit the
request and specify the page in the transform -p option.

System programmer response: None.
Problem determination: Not applicable.
Source: Infoprint Transforms to AFP for z/OS
Module: Not applicable.
Routing code: Not applicable.
Descriptor code: Not applicable.
Automation: Not applicable.
Chapter 7. Migrating from Infoprint Server Transforms V1.1

This chapter describes how to migrate from z/OS Infoprint Server Transforms Version 1 Release 1 (V1.1) to Infoprint Transforms to AFP Version 2 Release 1 (V2.1) for z/OS. It describes:

- The actions you might need to take when you migrate. After a successful migration, the transforms work the same way (or similar to the way) they do in V1.1.
- The actions you need to take to use new functions in V2.1.

Migrating to V2.1

Table 12 lists the tasks you might need to do when you migrate to Infoprint Transforms to AFP V2.1 for z/OS. Required tasks are required by all installations. Optional tasks are required only if the listed condition applies to your installation. Table 12 also indicates whether you can do each task before you install V2.1.

Table 12. Tasks for migrating from Infoprint Server Transforms V1.1

<table>
<thead>
<tr>
<th>Task</th>
<th>Condition</th>
<th>When to do the task</th>
<th>See page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Setting up security for the PDF to AFP and PostScript to AFP transform</td>
<td>Required</td>
<td>After installing V2.1</td>
<td>101</td>
</tr>
<tr>
<td>Removing the PDF to AFP and PostScript to AFP resource directory</td>
<td>Required</td>
<td>After installing V2.1</td>
<td>102</td>
</tr>
<tr>
<td>Transforming selected pages</td>
<td>Optional: To transform pages</td>
<td>Before installing V2.1</td>
<td>102</td>
</tr>
<tr>
<td>Adding fonts to the PDF to AFP and PostScript to AFP transform</td>
<td>Optional: To add fonts</td>
<td>After installing V2.1</td>
<td>103</td>
</tr>
<tr>
<td>Specifying a PostScript initialization file</td>
<td>Optional: To specify an initialization file</td>
<td>After installing V2.1</td>
<td>103</td>
</tr>
<tr>
<td>Removing environment variables for the PDF to AFP transform</td>
<td>Optional: To improve performance and clean up variables</td>
<td>After installing V2.1</td>
<td>104</td>
</tr>
<tr>
<td>Creating full-page AFP images</td>
<td>Optional: To create full-page AFP images</td>
<td>Before installing V2.1</td>
<td>104</td>
</tr>
</tbody>
</table>

Tip: No migration actions are required to use the SAP to AFP transform.

Setting up security for the PDF to AFP and PostScript to AFP transform

After you install V2.1 of the transform, you must set up security for the PDF to AFP and the PostScript to AFP transform. Security checking done in the transform requires that the user identifier (UID) of the executable file for the transform, ps2afpd, not be 0 (zero). Also, the set-user-ID flag for the file must be turned on.

When it is installed, file ps2afpd has a UID of 0. The new owner must have a UID that is not 0 and not the default UID.
Removing the PDF to AFP and PostScript to AFP resource directory

In V1.1, the resources that the PDF to AFP and the PostScript to AFP transforms use, such as fonts, were installed in directory `/usr/lpp/Printsrv/ps2afp`. In V2.1, resources are installed in directory `/usr/lpp/Printsrv/ps2afpv2`.

Therefore, if the transform configuration file (`aopxfd.conf`), specifies the name of the V1.1 transform resource directory, you must remove it after you install the new transforms.

To remove the V1.1 transform resource directory:

1. Stop the Infoprint Server Transform Manager. For example, use the AOPSTOP JCL procedure:
   
   ```
   START AOPSTOP,OPTIONS='-d xfd'
   ```

2. Delete the V1.1 resource directory:
   
   ```
   su
   rm -r /usr/lpp/Printsrv/ps2afp
   ```
   
   **Tip:** To use the `su` command, you must be permitted to the BPX.SUPERUSER profile in the FACILITY class in RACF.

3. If the AOPRESOURCE_PATH environment variable in the transform configuration file specifies directory `/usr/lpp/Printsrv/ps2afp`, remove the directory name.
   
   **Tip:** The default location of the transform configuration file is `/etc/Printsrv/aopxfd.conf`. However, you might have specified a different location in environment variable AOPXFD_CONF.

4. Restart the Infoprint Server Transform Manager. For example, use the AOPSTART JCL procedure:
   
   ```
   START AOPSTART
   ```

Transforming selected pages

In V1.1, the transforms to AFP let you specify which pages to include in the AFP output. You can specify an individual page number or a range of pages (for example, pages 1 through 10).

In V2.1:

- The PCL to AFP and the PDF to AFP transforms let you specify only one page or range of pages. You can specify the `-p pagerange` option only one time. If you specify `-p` multiple times, the transform uses only the last option.
  
  In addition, you cannot specify the `odd` and `even` values in the `-p` option.

- The PostScript to AFP transform does not let you specify pages at all. You cannot specify the `-p pagerange` and `-g pagerange` options.

To change how you specify pages:
1. On the **pcl2afp** and **pdf2afp** commands, remove multiple instances of the **-p** option. Remove the **-p** option if it specifies the **odd** or **even** value.

2. On the **ps2afp** command, remove the **-p** and **-g** options.

3. On the Processing panel of your printer definitions, make these changes to the **Filter** field:
   - Next to the **PCL** and **PDF** data formats, remove multiple instances of the **-p** option. Remove **-p** options that specify the **odd** or **even** value.
   - Next to the **PostScript** data format, remove the **-p** and **-g** options.

---

### Adding fonts to the PDF to AFP and PostScript to AFP transform

In V2.1, the PDF to AFP and the PostScript to AFP transforms provide different fonts than in V1.1. If your PDF and PostScript documents use fonts that the transform does not provide in V2.1 and that are not embedded in the PDF or PostScript documents, you can add these fonts to the transform.

You can add the same fonts as you added in V1.1. However, the way you add fonts in V2.1 is different from V1.1. So, if you added fonts in V1.1, you must add them again in V2.1 after you install the new transforms.

These differences exist in V2.1:
- If the file name for the font is not exactly the same as the font name in the PDF or PostScript document, you must specify the file name in the **Fontmap** file.
- The transform does not use the **preload.ps** file.

To add fonts:

1. Review the fonts that are provided with the transform to see which fonts you need to add, if any. For information, see "PDF to AFP and PostScript to AFP transform fonts" on page 111.

2. If you need to add fonts, follow the steps in "Adding fonts" on page 60.

---

### Specifying a PostScript initialization file

In V2.1, the PostScript to AFP transform does not use the PostScript initialization file **UserInit**. If you modified the **UserInit** file in V1.1, you can specify it in another way.

To specify a PostScript initialization file:

1. Determine if your installation modified the **UserInit** file in V1.1.
   - **Tip:** If your installation modified the **UserInit** file, the file is in the **lib** subdirectory of the directory specified in the AOP_RESOURCE_PATH environment variable in the transform configuration file (**aopxfd.conf**).

2. If you modified the **UserInit** file in V1.1:
• Specify the same UserInit file in the -i option of the ps2afp command for transforms that require this initialization file. For information, see "ps2afp—Transform PostScript data to AFP data" on page 24.

• Specify the file in the -i transform option in the Filter field next to the PostScript data format in your printer definitions. For more information, see "Requesting the PostScript to AFP transform" on page 82.

**Tip:** You can specify the -i option in both V2.1 and V1.1. Therefore, you can make this change before you install V2.1.

3. Delete the name of the resource directory that contains the UserInit file from the AOP_RESOURCE_PATH environment variable. (The AOP_RESOURCE_PATH variable should contain only the name of the fonts directory if you added fonts.)

4. Restart the Infoprint Server Transform Manager to pick up the changes to the transform configuration file. For example, use the AOPSTOP and AOPSTART JCL procedures:

```plaintext
START AOPSTOP,OPTIONS='\-d xfd'
START AOPSTART
```

### Removing environment variables for the PDF to AFP transform

In V2.1, the PDF to AFP transform:

- Ignores the AOP_BATCH_PAGE_SIZE environment variable. Therefore, you should remove this environment variable.
- Specifies LE run-time options that are suitable for the transform. Therefore, if you have specified the _CEE_RUNOPTS environment variable in V1.1, remove it unless the default run-time options that the transform sets in V2.1 are not suitable for your installation. For information, see "Changing Language Environment run-time options" on page 57.

You can remove these environment variables from the transform configuration file (aopxfd.conf) after you install V2.1 transforms.

To remove the environment variables:

1. Remove the environment variables from all transform entries in the transform configuration file, aopxfd.conf.

2. Restart the Infoprint Server Transform Manager to pick up the changes. For example, use the AOPSTOP and AOPSTART JCL procedures:

```plaintext
START AOPSTOP,OPTIONS='\-d xfd'
START AOPSTART
```

### Creating full-page AFP images

The V1 transforms always creates full-page AFP images. To create full-page AFP images in V2, you must specify the AOP_TRIM=no environment variable. For more information, see the description of the AOP_TRIM environment variable in Chapter 3, “Customizing transforms,” on page 43.
Using new functions

Table 13 lists the tasks you must do to use new functions in Infoprint Transforms to AFP V2.1 for z/OS and whether you can do each task before or after you install V2.1. These tasks are optional. Do them only if you want to use the new functions.

<table>
<thead>
<tr>
<th>Task</th>
<th>Condition</th>
<th>When to do the task</th>
<th>See page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Creating AFP records larger</td>
<td>Optional: To improve</td>
<td>Before installing V2.1</td>
<td>105</td>
</tr>
<tr>
<td>than 8K</td>
<td>performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tracing transforms</td>
<td>Optional: To trace</td>
<td>After installing V2.1</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>transforms</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stopping processing on error</td>
<td>Optional: To stop</td>
<td>Before installing V2.1</td>
<td>106</td>
</tr>
<tr>
<td></td>
<td>processing when errors</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>occur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disabling font-substitution</td>
<td>Optional: To disable</td>
<td>Before installing V2.1</td>
<td>106</td>
</tr>
<tr>
<td>messages</td>
<td>font-substitution messages</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Creating AFP records larger than 8K

In V2.1, the PCL to AFP, PDF to AFP, and PostScript to AFP transforms can create AFP records with a length up to 32 kilobytes. The default record length is 8K. However, a larger record length might improve performance. In V1.1, the transforms always create 8K records.

To create records larger than 8K:

1. Specify the record size in the AOP_RECLEN environment variable in the transform configuration file, aopxfd.conf. For example, to create 32K byte records specify:
   ```
   environment = {AOP_RECLEN -> 32}
   ```

   **Tip:** In V1.1, the transforms ignore this environment variable. Therefore, you can make this change before you install V2.1.

2. Restart the Infoprint Server Transform Manager to pick up the changes to the configuration file. For example, use the AOPSTOP and AOPSTART JCL procedures:
   ```
   START AOPSTOP,OPTIONS='-d xfd'
   START AOPSTART
   ```

Tracing transforms

In V2.1, you can trace the PCL to AFP, PDF to AFP, and PostScript to AFP transforms. In V1.1, you cannot trace these transforms.

To trace a transform, you can specify the -T transform option or the AOPTRACEON environment variable. The AOPTRACEDIR environment variable specifies the directory where the transforms write the trace file. For information, see "Tracing the PCL to AFP, PDF to AFP, and PostScript to AFP transforms" on page 88.
Stopping processing on error

In V2.1, the PCL to AFP, PDF to AFP, and PostScript to AFP transforms let you control whether the transform stops processing when an error occurs during the transform. By default, the transform continues processing when errors occur.

To enable the transform to stop processing on error:

1. Add the AOP_FAIL_ON_ERROR environment variable in all transform entries in the transform configuration file, aopxfd.conf. Specify:

   environment = {AOP_FAIL_ON_ERROR -> yes}

   If AOP_FAIL_ON_ERROR->yes, the return code from the transform is >0.

   Tip: In V1.1, the transforms ignore this environment variable. Therefore, you can make this change before you install the V2.1 transforms.

2. Restart the Infoprint Server Transform Manager to pick up the changes. For example, use the AOPSTOP and AOPSTART JCL procedures:

   START AOPSTOP,OPTIONS='-d xfd'
   START AOPSTART

Disabling font-substitution messages

In V2.1, the PDF to AFP, and PostScript to AFP transforms let you control whether the transform writes a message (AOP2500W) in the transform's stderr file when it substitutes fonts in a document. By default, the PDF to AFP, and PostScript to AFP transforms write font-substitution messages.

Note: The PCL to AFP transform does not write any font-substitution messages and does not support the AOP_FONT_SUBSTITUTION_MESSAGES environment variable.

To disable font-substitution messages:

1. Add the AOP_FONT_SUBSTITUTION_MESSAGES environment variable in all transform entries in the transform configuration file, aopxfd.conf. Specify:

   environment = {AOP_FONT_SUBSTITUTION_MESSAGES -> no}

   Tip: In V1.1, the transforms ignore this environment variable. Therefore, you can make this change before you install the V2.1 transforms.

2. Restart the Infoprint Server Transform Manager to pick up the changes. For example, use the AOPSTOP and AOPSTART JCL procedures:

   START AOPSTOP,OPTIONS='-d xfd'
   START AOPSTART
Appendix A. Accessibility

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

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

Using assistive technologies

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

Keyboard navigation of the user interface

Users can access z/OS user interfaces using TSO/E or ISPF. Refer to z/OS TSO/E Primer and z/OS ISPF User’s Guide Vol I for information about accessing TSO/E and ISPF interfaces. These guides describe how to use TSO/E and ISPF, including the use of keyboard shortcuts or function keys (PF keys). Each guide includes the default settings for the PF keys and explains how to modify their functions.

z/OS information

z/OS information is accessible using screen readers with the BookServer/Library Server versions of z/OS books in the Internet library at:

http://www.ibm.com/systems/z/os/zos/bkserv/
Table 14 lists all the environment variables the transforms use and indicates which transforms support the variable. For information about these environment variables, see:

- "Environment variables for the PCL to AFP transform" on page 45
- "Environment variables for the PDF to AFP and PostScript to AFP transforms" on page 53
- "Setting environment variables" on page 61

Table 14. Environment variables the transforms support

<table>
<thead>
<tr>
<th>Environment variable</th>
<th>PCL to AFP transform</th>
<th>PDF to AFP transform</th>
<th>PostScript to AFP transform</th>
<th>SAP to AFP transform</th>
</tr>
</thead>
<tbody>
<tr>
<td>_BPX_JOBNAME</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>_CEE_DMPTARG</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>AOP_FAIL_ON_ERROR</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>AOP_FONT_SUBSTITUTION_MESSAGES</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>AOP_HORIZONTAL_MARGINS</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>AOP_PAGE_HEIGHT</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>AOP_PAGE_WIDTH</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>AOP_RECLEN</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>AOP_RESOLUTION</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>AOP_RESOURCE_PATH</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>AOP_TRIM</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>AOP_SAP2AFP_RESOURCES</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>AOP_VERTICAL_MARGINS</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>AOPTRACEDIR</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>AOPTRACEON</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
</tbody>
</table>
Appendix C. Fonts

This appendix lists the fonts that the PCL to AFP, PDF to AFP, and PostScript to AFP transforms support.

PCL to AFP transform fonts

Table 15 lists the Monotype MicroType fonts that are built in to the PCL to AFP transform.

<table>
<thead>
<tr>
<th>Font Name</th>
<th>Courier</th>
<th>Palatino Roman</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albertus Extra Bold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Albertus Medium</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antique Olive</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antique Olive Bold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antique Olive Italic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arial</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arial Bold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arial Bold Italic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arial Italic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AvantGarde Book</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AvantGarde Book Oblique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AvantGarde Demi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AvantGarde Demi Oblique</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bookman Light</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bookman Light Italic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bookman Demi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bookman Demi Italic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG Omega</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG Omega Bold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG Omega BoldItalic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG Omega Italic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG Times</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG Times Bold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG Times BoldItalic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG Times Bold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CG Times BoldItalic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coronet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marigold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NewCenturySchlbk Bold</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NewCenturySchlbk BoldItalic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NewCenturySchlbkItalic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NewCenturySchlbk Roman</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zapf Chancery Medium Italic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zapf Dingbats</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

PDF to AFP and PostScript to AFP transform fonts

Table 16 lists the Ghostscript fonts that the PDF to AFP and PostScript to AFP transforms use. The Ghostscript fonts are functional equivalents of the corresponding PostScript fonts in that the typeface styles are similar and the font metrics are identical to provide the same pagination and line endings.

Table 16. PDF to AFP and PostScript to AFP transform fonts

<table>
<thead>
<tr>
<th>For this PostScript font</th>
<th>Ghostscript font:</th>
<th>Font file name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albertus-ExtraBold</td>
<td>A028-Ext</td>
<td>a028017t.pfb</td>
</tr>
<tr>
<td>Albertus-Medium</td>
<td>A028-Med</td>
<td>a028014t.pfb</td>
</tr>
<tr>
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Table 16. PDF to AFP and PostScript to AFP transform fonts (continued)

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