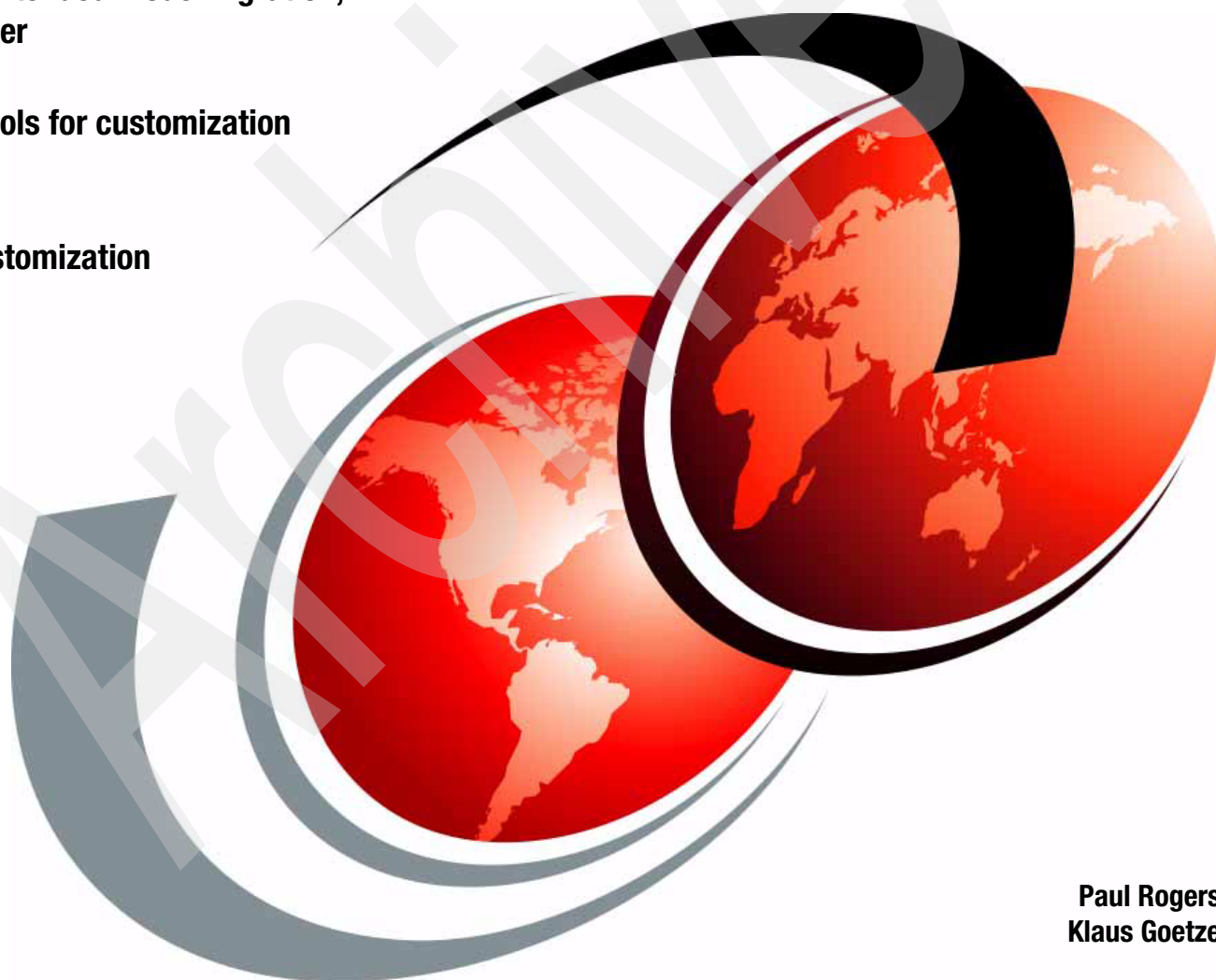# IBM Infoprint Server for z/OS Implementation Planning

Basic to extended mode migration, HTTP server

Sample tools for customization

ICONV customization

Paul Rogers
Klaus Goetze

Redbooks

IBM

International Technical Support Organization

IBM Infoprint Server for z/OS Implementation Planning

July 2008

Note: Before using this information and the product it supports, read the information in "Notices" on page vii.

First Edition (July 2008)

This edition applies to Version 1 Release 8 of z/OS (5694-A01), Version 1 Release 8 of z/OS.e (5655-G52), and to all subsequent releases and modifications until otherwise indicated in new editions.

Contents

iii

Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing, to:
IBM Director of Licensing, IBM Corporation, North Castle Drive, Armonk, NY 10504-1785 U.S.A.

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law: INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM Web sites are provided for convenience only and do not in any manner serve as an endorsement of those Web sites. The materials at those Web sites are not part of the materials for this IBM product and use of those Web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

This information contains examples of data and reports used in daily business operations. To illustrate them as completely as possible, the examples include the names of individuals, companies, brands, and products. All of these names are fictitious and any similarity to the names and addresses used by an actual business enterprise is entirely coincidental.

COPYRIGHT LICENSE:

This information contains sample application programs in source language, which illustrate programming techniques on various operating platforms. You may copy, modify, and distribute these sample programs in any form without payment to IBM, for the purposes of developing, using, marketing or distributing application programs conforming to the application programming interface for the operating platform for which the sample programs are written. These examples have not been thoroughly tested under all conditions. IBM, therefore, cannot guarantee or imply reliability, serviceability, or function of these programs.

vii

Trademarks

IBM, the IBM logo, and ibm.com are trademarks or registered trademarks of International Business Machines Corporation in the United States, other countries, or both. If these and other IBM trademarked terms are marked on their first occurrence in this information with a trademark symbol (® or ™), these symbols indicate U.S. registered or common law trademarks owned by IBM at the time this information was published. Such trademarks may also be registered or common law trademarks in other countries. A current list of IBM trademarks is available on the Web at "Copyright and trademark information" at:
http://www.ibm.com/legal/copytrade.shtml

The following terms are trademarks of the International Business Machines Corporation in the United States, other countries, or both:

AIX®	MVS™	Redbooks®
CICS®	NetSpool™	Redbooks (logo) ®
IBM®	OS/390®	REXX™
IMS™	Print Services Facility™	VTAM®
IP PrintWay™	PrintWay™	z/OS®
Language Environment®	RACF®	

The following terms are trademarks of other companies:

PostScript, and Portable Document Format (PDF) are either registered trademarks or trademarks of Adobe Systems Incorporated in the United States, other countries, or both.

ABAP, SAP R/3, SAP, and SAP logos are trademarks or registered trademarks of SAP AG in Germany and in several other countries.

Java, and all Java-based trademarks are trademarks of Sun Microsystems, Inc. in the United States, other countries, or both.

Internet Explorer, Microsoft, Windows, and the Windows logo are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.

Preface

This IBM® Redbooks® publication provides installation and customization information and samples to help you implement IBM Infoprint Server for z/OS®. Infoprint Server is an optional feature of z/OS that uses z/OS UNIX® System Services. This feature is the basis for a total print serving solution for the z/OS environment. It lets you consolidate your print workload from many servers onto a central z/OS print server.

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

The following topics are described:

► Migrating from basic mode to extended mode

► Configuring an HTTP server for Infoprint Central

► Coordinating settings in JES, OMVS, TCP/IP, and the Printer Inventory using a cross-reference tool, with documentation

► Viewing messages in aoplogu using sample AOPBATCH JCL

► Monitoring and cleaning up CEEDUMP file using a sample tool

► Customizing the ICONV tables for custom code-page creation

The team that wrote this book

This book was produced by a team of specialists from around the world working at the International Technical Support Organization, Poughkeepsie Center.

Paul Rogers is a Consulting IT Specialist at the International Technical Support Organization, Poughkeepsie Center who has worked for IBM for almost 41 years. He writes extensively and teaches IBM classes worldwide on various aspects of z/OS, z/OS UNIX, JES3, and Infoprint Server. Before joining the ITSO 20 years ago, Paul worked in the IBM Installation Support Center (ISC) in Greenford, England for eight years, providing OS/390® and JES support for IBM EMEA. He also worked in the Washington Systems Center for three years.

Klaus Goetze is an IT specialist in Germany. He has 15 years of experience in support of MVS™, OS/390, and z/OS software products. His areas of expertise include JES2, JES3, Infoprint Server, PSF, and AFP architecture.

Become a published author

Join us for a two- to six-week residency program! Help write a book dealing with specific products or solutions, while getting hands-on experience with leading-edge technologies. You will have the opportunity to team with IBM technical professionals, Business Partners, and Clients.

Your efforts will help increase product acceptance and customer satisfaction. As a bonus, you will develop a network of contacts in IBM development labs, and increase your productivity and marketability.

Find out more about the residency program, browse the residency index, and apply online at:

ibm.com/redbooks/residencies.html

Comments welcome

Your comments are important to us!

We want our books to be as helpful as possible. Send us your comments about this book or other IBM Redbooks in one of the following ways:

► Use the online **Contact us** review Redbooks form found at:

ibm.com/redbooks

► Send your comments in an e-mail to:

redbooks@us.ibm.com

► Mail your comments to:

IBM Corporation, International Technical Support Organization
Dept. HYTD Mail Station P099
2455 South Road
Poughkeepsie, NY 12601-5400

Infoprint Server

As mentioned, Infoprint Server is an optional feature of z/OS that uses z/OS UNIX System Services. The feature is the basis for a total print serving solution for the z/OS environment, allowing you to consolidate your print workload from many servers onto a central z/OS print server.

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

Following are examples of printing situations in which you can use Infoprint Server:

► Printing old style IMS™ or CICS® output data on network printers (ASCII printers in a TCP/IP network and VTAM®-controlled printers in an SNA network)

► Printing UNIX data on AFP printers

► Printing Web documents data using the Windows® SMB printing protocol

► Printing Web documents using the Infoprint Port Monitor for Windows

► Printing documents over the Internet using the Internet Printing Protocol (IPP)

► Printing data from batch applications to network printers

► Printing AFP data from batch applications on LAN-based Printer Control Language (PCL) printers and to e-mail destinations

► Printing AFP documents from Windows environments

► Printing SAP® R/3 Output Text Format (OTF) and Advanced Business Application Programming (ABAP™) data stream files on AFP printers

► Monitoring printer status

1.1 Infoprint Server overview

The Infoprint Server feature is the basis for a total print serving solution for the z/OS environment on a TCP/IP network. Infoprint Server lets users submit print requests from remote workstations in a TCP/IP network, from UNIX System Services applications, from batch applications, and from VTAM applications, such as CICS or IMS applications. It allows you to consolidate your print workload from the servers onto a central z/OS print server.

Print Interface
Print Interface is the component of Infoprint Server that processes print requests received from both remote clients and local users. When the Print Interface receives a print request, it allocates an output data set on the JES spool.

IP PrintWay™
IP PrintWay is the component of Infoprint Server that transmits output data sets from the JES2 or JES3 spool to network printers, or to other host systems in your TCP/IP network. The remote printer or host system must support the LPR/LPD protocol, the IPP protocol, or direct socket printing. IP PrintWay provides fast access to TCP/IP-connected printers and to Virtual Telecommunications Access Method (VTAM)-controlled printers.

NetSpool™
NetSpool intercepts print data from VTAM applications, such as CICS and IMS; transforms the data streams to EBCDIC line data, PCL, PDF, or other formats that the target printer accepts; and writes the output data set to the JES spool. JES or PSF can print the output data sets, or JES can transmit them to other locations for printing. IP PrintWay can transmit the output data sets to remote printers in your TCP/IP network.

Infoprint Central
Infoprint Central is a Web-based print management system primarily intended for help desk operators. However, other authorized users or job submitters can also use it. Infoprint Central works with IP PrintWay extended mode.

Infoprint Transform
Infoprint Transforms are programs that convert a data stream from one format to another (for example, from PCL to AFP, AFP to PDF, and so on). These data stream transforms give you the flexibility to print a variety of output on a wide range of printers.

SNMP subagent
Simple Network Management Protocol (SNMP) is a set of protocols that describes management data and the protocols for exchanging that data between heterogeneous systems.

1.2 Tasks required to implement Infoprint Server

The following tasks are required to implement Infoprint Server:

► Create a UNIX System Service file system
► Define environment variables
► Define users for administration and operations
► Set permissions for directories and executable files
► Customize Infoprint Server configuration files
► Start Infoprint Server
► Stop Infoprint Server daemons

The following sections explain how to complete these tasks.

1.2.1 Create a UNIX System Service file system

First, you need to create a file system that contains the Printer Inventory and other Infoprint Server files. You can use a batch job, as shown in Figure 1-1, or you can use the ISPF shell or the TSO/E ALLOCATE command to create a HFS or zFS data set.

```
//STEP01   EXEC PGM=IEFBR14
//HFS        DD DSN=OMVS.PRINTSRV.HFS,SPACE=(CYL,(20,1,1)),
//              DSNTYPE=HFS,DCB=(DSORG=PO),
//              DISP=(NEW,CATLG,DELETE),
//              STORCLAS=OPENMVS
```

Figure 1-1   Batch job to create a UNIX System Service file system

If your system is part of a sysplex, the file system must be system-specific and designated NOAUTOMOVE in the BPXPRMxx parmlib member. You can enter a **mount** command to mount the file system:

```
MOUNT FILESYSTEM('OMVS.PRINTSRV.HFS') TYPE(HFS) MOUNTPOINT('/var/Printsrv')
```

Printer Inventory files

Infoprint Server creates the Printer Inventory files automatically the first time that Printer Inventory Manager is started. The Printer Inventory contains the following files:

► master.db
► jestoken.db
► pwjestoken.db

All database files are optimized for rapid direct access to objects. When you add objects to the Printer Inventory, these files increase in size. When you remove objects, the files do not decrease in size because the Printer Inventory Manager simply designates as available the space within the file that had been occupied by the removed objects. When you add objects in the future, the Printer Inventory Manager uses available space within the files. The files increase in size only when they do not contain sufficient available storage. So, the size of each file can be characterized as a high-water mark.

/etc/Printsrv directory

Another directory required: the /etc/Printsrv directory. The /etc/Printsrv directory contains all Infoprint Server configuration files. This directory is created automatically with the appropriate permissions when you install Infoprint Server. For a secure environment, this directory should be owned by the UID of 0 and should be writable only by users with an effective UID of 0.

1.2.2 Define environment variables

There are environment variables that are either required or optional. Environment variables affect the processing of Infoprint Server directly. Required variables must always be set; they are shown in Figure 1-2. Optional variables must be set if the default value is not suitable for your installation. The optional variables may be set in either **aopstart** REXX™ or in the IP PrintWay procedure.

```
LIBPATH="/usr/lpp/Printsrv/lib'
MANPATH="/usr/lpp/Printsrv/man/C"
NLSPATH="/usr/lpp/Printsrv/En_US/%N"
PATH="/usr/lpp/Printsrv/bin:/bin:."
```

Figure 1-2 Required environment variables settings for Infoprint Server

The Printer Inventory Manager, as well as other Infoprint Server daemons, use environment variables specified in the **aopstart** REXX EXEC. In addition, the daemons accept certain variables from the run-time environment, such as environment variables that control tracing, locale, and the language for messages. For example, you must specify the path of directories where you have installed the Infoprint server product. The recommended place is /etc/profile.

> **Note:** The **aopstart** command is a REXX EXEC that sets environment variables that Infoprint Server daemons use. It also starts the Printer Inventory daemon and any other daemons specified in the start-daemons attribute in the Infoprint Server configuration file (aopd.conf).
>
> The **aopstart** EXEC provided with Infoprint Server is suitable for most installations. However, you must edit the **aopstart** EXEC if you need to specify certain environment variables. For security reasons, Infoprint Server uses some environment variables only if they are set in the aopstart EXEC. Infoprint Server does not use the same variables set in the /etc/profile file.

These environment variables should be added in front of existing ones. This is important because Infoprint Server provides commands, like **lp** and **lpstat**, that already exist in UNIX System Services. In other words, the order of libraries decides which commands are used.

1.2.3 Define users for administration and operations

Define Infoprint Server administrators and operators to the security product as z/OS UNIX users. An Infoprint Server administrator must be able to read and update the Printer Inventory. Connect Infoprint Server administrators and operators to groups.

The user profiles of the Infoprint Server administrators and operators must have an OMVS segment and a home directory. Establish an OMVS segment and define the home directory to RACF® using the RACF ADDUSER command to add a new user or the ALTUSER command to change an existing user, or whatever methods are currently in use to create security definitions.

> **Tip:** The sample CLIST in SYS1.SAMPLIB(AOPRACF) contains the RACF commands.

1.2.4 Set permissions for directories and executable files

The system assigns default permission bits for files and directories at creation time. The settings depend on the type of command or facility that is used. When the executable file is a set-user-ID or set-group-ID file, the file owner's UID or GID must be defined to the Security Access Facility (SAF). The `aopsetup` shell script helps you to set up the correct z/OS UNIX permissions for Infoprint Server directories and executable files before you start Infoprint Server daemons for the first time. Also rerun `aopsetup` whenever you change files in one of the Infoprint Server directories.

> **Important:** You must run the `aopsetup` shell script to set up the correct z/OS UNIX permissions for Infoprint Server directories and executable files *before* you start Infoprint Server daemons for the first time.

You can run `aopsetup` from an rlogin shell, from an OMVS session, or with the BPXBATCH JCL job. Specify the names of the groups you defined for Infoprint Server operators and administrators as arguments to `aopsetup`. For example, if you defined one group to RACF named AOPOPER for operators and another group named AOPADMIN for administrators, then enter:

```
/usr/lpp/Printsrv/bin/aopsetup AOPOPER AOPADMIN
```

If /etc/profile has been updated to include the environment variables for the PATH, then simply enter:

```
aopsetup AOPOPER AOPADMIN
```

1.2.5 Customize Infoprint Server configuration files

The Infoprint Server configuration files (aopd.conf, aopxfd.conf, and aopmsg.conf) allow you to customize the Printer Inventory Manager and other components of Infoprint Server. These files are optional. If the configuration files do not exist, or if an attribute in the configuration files is omitted, then default values are used.

> **Note:** The default location for these files is /etc/Printsrv/.

For security reasons, only users with a UID of zero (0) should be allowed to edit these configuration files.

1.2.6 Start Infoprint Server

Although it is not very probable that an operator would enter the OMVS shell and enter the `aopstart` command, this command can be used to start the Infoprint Server. To do so, either the operator user ID must have a TSO segment in the user profile, or the operator must enter the OMVS shell by using Telnet.

The AOPSTART procedure provided by Infoprint Server invokes the `aopstart` command to start the Printer Inventory Manager daemon (aopd) and any other daemons that are specified in the start-daemons attribute in the aopd.conf configuration file.

You must define the AOPSTART and AOPSTOP procedures to the RACF STARTED class. If you want to use the started procedure table (ICHRIN03) instead, refer to *z/OS Security Server RACF Security Administrator's Guide*, SA22-7683 for more information.

> **Important:** Do not restart the Infoprint Server until *all* components are stopped.

1.2.7 Stop Infoprint Server daemons

To stop the Printer Inventory Manager daemon, as well as all other Infoprint Server daemons, enter the `aopstop` command without specifying any daemon names. The Print Interface component of Infoprint Server stops accepting new print requests and completes all work in progress before shutting down.

The AOPSTOP procedure provided by Infoprint Server invokes the `aopstop` command to stop the Printer Inventory Manager daemon (aopd) and all other daemons currently running.

To use the `aopstop` command, the user ID must either be a member of the Security Server RACF AOPOPER group, or have a UID of 0

> **Note:** Before you stop the Printer Inventory Manager daemon, stop other programs that are using the Printer Inventory (such as NetSpool, IP PrintWay, and PSF for OS/390).

An operator can enter the OMVS shell to stop all active daemons (including the Printer Inventory Manager daemons) after current activity ends. To do that, use this command from the OMVS shell:

```
aopstop
```

You can specify the daemon to stop. If you omit this option, all active daemons are stopped, including the Printer Inventory Manager daemons (aopd, aophinvd, aoplogd, and aopsdbd). To stop the Transform Manager and line printer daemons, use this command from the shell:

```
aopstop -d xfd -d lpd
```

To stop all daemons immediately, use this command (note that documents being processed may be lost, however).

```
aopstop now
```

1.3 Infoprint Server ISPF panels

The Infoprint Server administrator can use Infoprint Server ISPF panels to add, browse, copy, edit, and delete printer definitions and other objects in the Printer Inventory.

Normally, using the instructions in the ISPF Setup sections in the z/OS Program Directory, you need to concatenate the following libraries into the TSO logon procedure:

► AOP.SAOPPENU panel libraries to DD statement ISPPLIB
► AOP.SAOPMENU message libraries to DD statement ISPMLIB

Concatenate library AOP.SAOPEXEC to DD statement SYSPROC or SYSEXEC.

The ISPF z/OS System Programmer Primary Option menu (member ISR@390S in the ISP.SISPPENU library) provides a sample of how to invoke the Printer Inventory Manager ISPF application. You can update your ISPF primary option menu to include a selection option for the Printer Inventory Manager.

Before using the ISPF panels, review and customize the AOPINIT EXEC provided in AOP.SAOPEXEC. The Printer Inventory Manager ISPF application REXX EXEC library, AOP.SAOPEXEC, is required to be included into the SYSPROC or SYSEXEC DD statement concatenation, or be dynamically available through the TSO ALTLIB service.

1.4 Tasks required to implement IP PrintWay

IP PrintWay transmits output data sets from the JES spool to remote printers or print servers and to e-mail destinations.

You can run either IP PrintWay basic mode or IP PrintWay extended mode:

► IP PrintWay basic mode, the original mode of operation, uses the z/OS Functional Subsystem Interface (FSI) to obtain output data sets from the JES spool. IBM does not plan additional enhancements to IP PrintWay basic mode.

► IP PrintWay extended mode, starting with z/OS V1R5, uses the z/OS SYSOUT Application Programming Interface (SAPI) to obtain output data sets from the JES spool. It provides better performance, improved usability, and more function than IP PrintWay basic mode.

The general recommendation is to migrate to IP Printway extended mode as soon as possible. If you install Infoprint Server and IP Printway for the first time, then there is no need to define IP Printway basic mode. IP Printway extended mode is a full function replacement. Tasks required implementing IP Printway basic mode are more extensive and you must make additional definitions in the Job Entry Subsystem (JES).

1.4.1 IP PrintWay extended mode customization

The recommendation is to run IP PrintWay extended mode to obtain better performance, improved usability, and additional functions. Also, IBM does not plan to add new functions to IP PrintWay basic mode in future releases.

To start IP Printway extended mode, specify **outd** in the start-daemon attribute of the aopd.conf configuration file and run the AOPSTART JCL procedure or enter the **aopstart** command.

The aopd.conf configuration file might be updated to include:

► **start-daemons = { outd }** - Specifies the daemons that start when you run the **aopstart** command or AOPSTART JCL procedure.

► **smf-recording = yes | no** - Indicates whether IP PrintWay extended mode is to write SMF type 6 records for data sets that it sends to a printer or e-mail destination.

► **resolve-printway-printers = yes | no** - Indicates whether IP PrintWay extended mode looks up the full hostnames of printers in the Domain Name Server (DNS).

IP PrintWay extended mode writes data to the /var/Printsrv/printway directory before sending the data to the printer. Therefore, carefully estimate the amount of space required for the file system.

1.4.2 IP PrintWay basic mode customization

IP PrintWay basic mode customization support requires special JES printers to be started in order to communicate with the FSAs in the FSS address space.

FSS procedure ANFWPROC

IP PrintWay provides a startup procedure in SYS1.PROCLIB(ANFWPROC). You can use the same startup procedure to start more than one IP PrintWay FSS, but only if you want all IP PrintWay FSSes to share the same IP PrintWay transmission-queue and message-log data sets. You must specify the name of this startup procedure in the JES initialization statement for each FSS definition.

Define JES basic mode printers

You must define a Functional Subsystem (FSS) and a Functional Subsystem Application (FSA) to the primary Job Entry Subsystem (JES2 or JES3). Figure 1-3 shows sample statements for JES2.

```
FSS(PRINTWAY)    PROC=ANFWPROC,AUTOSTOP=YES
PRT1             CLASS=E,FSS=PRINTWAY,MODE=FSS,PRESELCT=NO,
                 START=NO,TRKCELL=YES,UCS=0,WS=(Q)
```

Figure 1-3   Sample JES2 initialization statements

Figure 1-4 shows sample statements for JES3.

```
FSSDEF,FSSNAME=PRINTWAY,PNAME=ANFWPROC,TYPE=WTR
DEVICE,DTYPE=PRTAFP1,FSSNAME=PRINTWAY,JNAME=PRT1,JUNIT=(,SYS1,UR,ON),
       MODE=FSS,PDEFAULT=(CHARS,FCB),WC=(E),WS=(CL,F)
```

Figure 1-4   Sample JES3 initialization statements

Several IP PrintWay FSAs can run in the same FSS. The FSA, after it is started, selects a data set to print by requesting the data set from JES.

Only one IP PrintWay FSS is required. However, for improved throughput and more efficient use of system resources, up to 2000 FSSes can be defined. To ensure that data sets are always transmitted in the same order as IP PrintWay acquires them from the JES spool, you must specify the same transmission queue data set in the startup procedure for each FSS.

IP PrintWay transmission queue

IP PrintWay keeps track of the work in process in the transmission queue data set. The IP PrintWay transmission queue is a VSAM cluster and contains an entry for each data set that IP PrintWay is transmitting to the remote systems, or that IP PrintWay is retaining on the JES spool. When a data set is selected to be printed, IP PrintWay creates an entry in the transmission-queue data set.

The IP PrintWay transmission-queue data set is a VSAM key-sequenced data set. You can define it with any name. A sample job is provided in SYS1.SAMPLIB(ANFDEAL), with a default data set name of ANF.QUEUE.

After allocating space for the transmission-queue data set, use the sample JCL in SYS1.SAMPLIB(ANFQINIT) to initialize the data set with binary zeroes. If you did not use the default name ANF.QUEUE for the data set, then change the name of the data set in the sample JCL.

IP PrintWay message log

IP PrintWay writes messages that track data set transmissions in an IP PrintWay message-log data set. This is a required data set.

You can create one message-log data set to be shared by all IP PrintWay functional subsystems (FSSes), or you can create separate data sets for each FSS. To allocate space for the data set and initialize it, use the sample JCL in SYS1.SAMPLIB(ANFMIJCL) to run the ANFMFILE program.

1.5 Implementation of NetSpool

NetSpool intercepts print data from VTAM applications, such as CICS and IMS; transforms the data streams to EBCDIC line data, PCL, PDF, or other formats that the printer accepts; and creates output data sets on the JES2 or JES3 spool.

The administrator must create or update the printer definition for each printer in the Printer Inventory and specify printer attributes required by NetSpool.

The administrator must also define each NetSpool printer logical unit (LU) to VTAM, and modify VTAM resource definitions if necessary.

NetSpool daemon aopnetd

The operator must start NetSpool and vary the NetSpool printer LUs active. You must add the netd value to any existing value in the start-daemon attribute to start the aopnetd daemon. The NetSpool daemon aopnetd controls part of the NetSpool processing. You start the daemon with the `aopstart` command. You can only run one NetSpool daemon, but it can control several NetSpool started tasks.

FSS procedure APIJPJCL

Before starting NetSpool, you must create a startup procedure. NetSpool provides a startup procedure in SYS1.PROCLIB(APIJPJCL). You can start more than one NetSpool task at the same time. Each started task runs in a different address space. If you start more than one NetSpool task, specify unique class values in the LUCLASS parameter in the startup procedure for each task. These class values correspond to LU class values specified in the printer definitions in the Printer Inventory.

2

Using the Security Authorization Facility for Infoprint Server security

The Security Authorization Facility (SAF) interface provides security for Infoprint Server. SAF is part of the z/OS environment and is always present. Infoprint Server uses the SAF interface to route authorization requests to the external security manager.

Using the SAF interface for Infoprint Server security delivers the following benefits:

► Dynamic change of security profiles

► Single image of security information

► Simple introduction of security philosophy

► Improved auditability

► Improved protection

This chapter provides general information about RACF security. It demonstrates how to establish SAF security for Infoprint Server, and explains how to set up security for the Printer Inventory, common message log, and operator commands. You can specify which users can read and update the Printer Inventory, view messages in the common message log, and start and stop Infoprint Server daemons.

2.1 Security processing

Security processing within z/OS UNIX differs in many ways from standard security processing in MVS. MVS resources like users and data are protected by RACF profiles stored in the RACF database. RACF refers to the profiles when deciding which users should be permitted to protected system resources. Security administration is done with RACF commands or RACF ISPF panels.

2.1.1 MVS security versus z/OS UNIX security

z/OS UNIX users are defined as MVS users and they are administrated by RACF profiles. The security information for files and directories in a hierarchical file system is stored within the file system itself in a file security packet (FSP). HFS files and directories are protected by permission bit information which is kept in the FSP. Administration of file security is performed by using z/OS UNIX shell commands, or ISHELL menu options. Figure 2-1 illustrates MVS security versus z/OS UNIX security.

MVS Data Set Security	UNIX File Security
RACF administrator	z/OS UNIX Superuser
❏ Access to all data sets	❏ Access to all files
All other users	All other users
❏ Access to a data set if RACF profile permits	❏ Access to a file if permission bits allow ❏ or ACL allows (z/OS 1.3) ❏ or UNIXPRIV allows
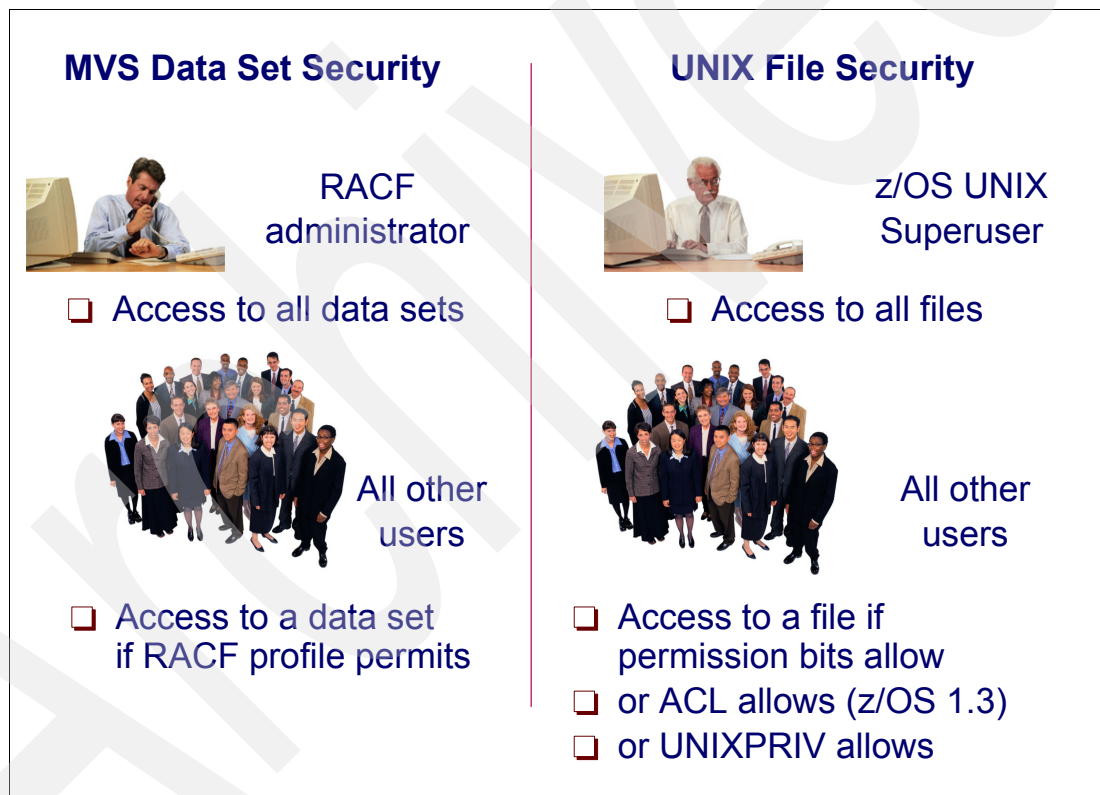
Figure 2-1   MVS versus UNIX System Services

As shown in the figure, z/OS UNIX users do not work with data sets; instead, they work with files and directories. z/OS UNIX users do not have to be aware that their data is located physically in an HFS data set. All they see is the hierarchical file structure made up of multiple mounted HFS data sets. The FSPs are maintained by z/OS UNIX commands. RACF data set profiles cannot be used to protect z/OS UNIX files and directories.

User administration is similar for regular MVS users and z/OS UNIX users. Every user must present a password when logging on to the system. z/OS UNIX uses a UID and GID for each user, and this information is stored in RACF profiles together with the user ID and password

information. The concept of a "superuser" in z/OS UNIX is similar to a RACF security administrator.

UNIX systems incorporate a concept of users and groups similar to that of RACF. A user UNIX identifier (UID) is zero (0) for a superuser, or any other number for normal users. The superuser has unlimited authority within UNIX System Services. User numbers do not have to be unique and it is possible (though not recommended) for several users to share the same UID. UNIX sees these users as being the same entity, and they receive the same level of authorization.

Users are all related to a *group*. Groups allow authority to be controlled in a more economical way, in that giving access to a group is significantly easier than giving access to several hundred users. If you want to distinguish between administrators and operators, you need to define groups.

You can choose any names for these groups, however, AOPOPER and AOPADMIN are frequently used in the literature. Define these groups to RACF with a z/OS UNIX group identifier (GID) to protect access to the Printer Inventory, the common message log, and Infoprint Server operator command.

AOPADMIN   This group is for Infoprint Server administrators, who can view and update the Printer Inventory and view all messages in the common message log.

AOPOPER   This group is for Infoprint Server operators, who can start and stop Infoprint Server daemons.

2.1.2 File and directory permission bits

Permission bit information is stored in the file security packet (FSP) within each file and directory. Permission bits allow you to specify read authority, write authority, execute authority, or search authority.

When an access check is to be done, the PFS calls SAF with the type of check that is being requested. SAF passes these to the security product, which extracts user information from the current security environment and compares it against the access control that is stored within the FSP. Figure 2-2 on page 14 illustrates the FSP used by RACF for authorization.
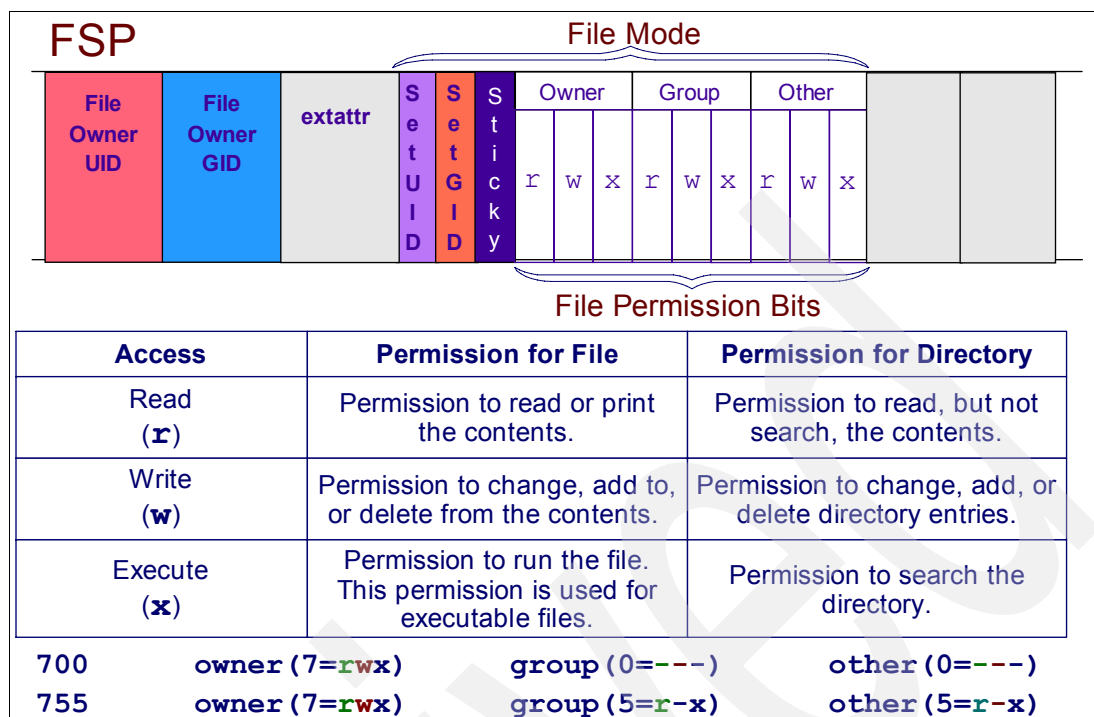
Figure 2-2   File security packet (FSP) used by RACF for authorization

2.1.3 File security packet (FSP)

Each z/OS UNIX file and directory has a file security packet (FSP) associated with it to control access, as shown in Figure 2-3 on page 15. The FSP is created when a file or directory is created. The FSP is stored in the file system for the life of the file or directory until the file or directory is deleted, at which time the FSP is also deleted.

The FSP consists of:

► File owner UID
► File owner GID
► File mode, as explained in the following section

File mode

The file mode consists of the following bits and the permission bits:

SetUID   This bit only relates to executable files. If on, it causes the UID of the user executing the file to be set to the file's UID.

SetGID   This bit only relates to executable files. If on, it causes the GID of the user executing the file to be set to the file's GID.

Sticky bit   This bit only relates to executable files. If on, it causes the file to be retained in memory for performance reasons. The implementation of this varies between platforms:
- In z/OS UNIX, it means programs are loaded from an LPA (or LNKLST as per normal MVS program search) instead of an HFS file.
- For a directory, the sticky bit causes UNIX to permit files in a directory or subdirectories to be deleted or renamed only by the owner of the file, by the owner of the directory, or by a superuser.

File mode permission bits

The file mode also has the file permission bits, consisting of:

- ▶ Owner read/write/execute permissions
- ▶ Group read/write/execute permissions
- ▶ Other (or all users) read/write/execute permissions

Where:

r   Read (r) access to both files and directories.
w   Write (w) access to both files and directories.
x   Execute (x) has a different meaning for files and directories:
        - For an executable file, an access of x means that the user can execute the file.
        - For a directory, an access of x means the user can search the directory.

> **Note:** In z/OS UNIX, these three permissions are not hierarchical. For example, a user with write permission who does *not* have read permission, can only write over existing data or add data to a file, and cannot look at the contents of the file or print the file. Similarly, write and read permission does not allow a user to execute a file or search a directory.

Both read (r) and execute (x) are required in order to execute a shell script. In order to access HFS files, a user needs the following:

- ▶ Search (x) permission to all the directories in the path name of files the user wants to access

- ▶ Write permission to directories where the user will be creating new files and directories

- ▶ Read and write permission, or read or write permission as appropriate, to files for access

- ▶ Execute (x) permission for an executable file

Extended attributes

Another section of the FSP, which is specific to the z/OS UNIX implementation, is called Extended Attributes (extattr); see Figure 2-3. It contains flags to mark HFS program files as APF-authorized and program-controlled. A shell command **extattr** is used to manipulate these bits.
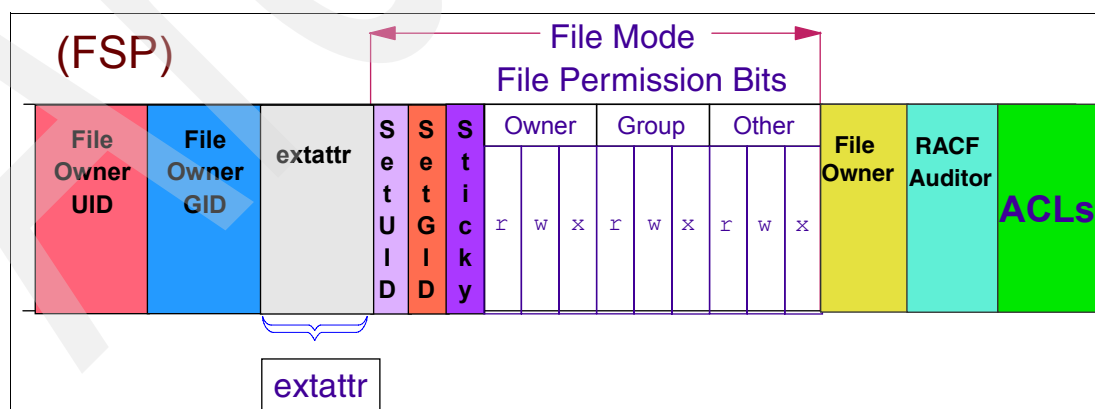
Figure 2-3   File security packet (FSP)

2.1.4 Setting permissions for directories and executable files

The system assigns default permission bits for files and directories at creation time. The settings depend on the type of command or facility that is used. When the executable file is a set-user-ID or set-group-ID file, the file owner's UID or GID must be defined to the Security Access Facility (SAF). The aopsetup shell script helps you to set up the correct z/OS UNIX permissions for Infoprint Server directories and executable files before you start Infoprint Server daemons for the first time. Also, you should rerun aopsetup whenever you change files in one of the Infoprint Server directories.

The aopsetup shell script sets permissions so that this directory is readable and writeable only by members of the RACF group for Infoprint Server administrators (AOPADMIN) and users with an effective UID of 0. If you specify a different directory in the base-directory attribute in the Infoprint Server configuration file (aopd.conf), aopsetup creates that directory instead of the /var/Printsrv directory.

If Infoprint Server is installed in a different directory, then an environment variable called INSTALL_DIR needs to be set to the directory where Infoprint Server was installed.

The aopsetup shell script requires two positional arguments:

```
aopsetup operator-group administrator-group
```

Where:

operator-group This is the name of the RACF group you created for Infoprint Server operators. The suggested RACF group name is AOPOPER. However, you might have used a different name for this group. This argument is required.

administrator-group This is the name of the RACF group you created for Infoprint Server administrators. The suggested RACF group name is AOPADMIN. However, you might have used a different name for this group. This argument is required.

2.2 Summary of UNIX commands

Much of the z/OS UNIX activity dealing with protected Infoprint Server resources involves creating, changing, and deleting files and directories. To protect the data in a file from unauthorized users, the system controls who can change the file access. You cannot use RACF commands or panels to set the file mode, UID, or GID.

An alternative is to use the ISHELL menus. They may be more user-friendly for people who are not familiar with UNIX, and they provide help information.

chown command

To change the owner (UID) of a file, the superuser can enter a **chown** command. The **chown** command also turns off the set-user-ID bit and set-group-ID bit of the named files and directories.

```
chown [-fhR] owner [:group] pathname ...
```

chgrp command

To change the group (GID) of a file, the superuser or the file owner can enter a **chgrp** command, specifying either a RACF group name or a GID. The file owner must have the new group as his or her group, or one of his or her supplementary groups. The **chgrp** command also turns off the set-user-ID bit and set-group-ID bit of the named files and directories.

```
chgrp [-fhR] group pathname ...
```

chmod command

To change the file mode of a file, the superuser or the file owner can enter a **chmod** command.

```
chmod [-fhR] mode pathname
```

The **chmod** command is used to make a change to the file mode mask of a file or directory, as follows:

► The z/OS UNIX shell command **chmod u-x,g+r,o+r** deletes execute (x) from the owner (u for user) permissions, adds read (r) to the group (g) permissions, and adds read (r) to the other (o) permissions.

► The same effect can be achieved with **chmod u=rw,go=r** which sets the owner (u) mask to read/write (rw), and sets the group and other (go) mask to read (r). When the equal (=) sign is used, it turns on the bits specified and turns off all other bits.

► The command **chmod a=rwx** sets on the read, write, and execute bits for all (a) users, which includes the owner, group, and other.

► An equivalent command is **chmod rwx** in which the a (all users) is implied.

► In the command **chmod go-rwx**, rwx is turned off for group and other.

► An alternative form **chmod u=rwx** sets rwx on for the owner (u) mask, and turns off all other bits.

► The command **chmod u+s** shows how to turn on the SetUID bit. The **s** stands for set, and the **u** stands for UID. To turn on the SetGID bit, use **chmod g+s**. To turn on the sticky bit, use **chmod +t**.

Using octal notation with chmod

Octal notation can be used on the **chmod** command instead of the symbolic notation. With octal notation, each set of three bits is represented in a single octal digit. For example, a permission of rwx would be represented as the octal digit 7, which is the sum of the 4 for read (r), the 2 for write (w), and 1 for execute/search (x), as follows:

► In the command **chmod 644**, the octal 6 sets read and write (4+2) for the file owner, and sets read (4) for group and other users.

► The command **chmod 777** sets on read/write/execute (4+2+1) for the owner, group, and other users.

► The command **chmod 700** sets on the read, write, and execute bits (4+2+1) for the owner, and gives no access to group and other users.

► In the last command **chmod 4700** we see how to set the set UID, set GID, and sticky bits. This is done by using four octal digits, where the first digit represents the set UID, set GID, and sticky bits. Here, SetUID is the left-most bit (4), SetGID is the middle bit (2), and the sticky bit is the right-most bit (1).

2.3 Summary of RACF commands

Much of the RACF activity dealing with protected Infoprint Server resources involves creating, changing, and deleting general resource profiles.

To create a resource profile, use the RDEFINE command. Generally, after you have created a profile, you then create an access list for the profile using the PERMIT command. For example:

```
RDEFINE  class_name  profile_name  UACC(NONE)
PERMIT  profile_name  CLASS(class_name)  ID(user or group)
ACC(access_authority)
```

To remove the entry for a user or group from an access list, issue the PERMIT command with the DELETE operand instead of the ACCESS operand.

```
PERMIT  profile_name  CLASS(class_name)  ID(user or group)  DELETE
```

If you want to change a profile, for example, to change UACC from NONE to READ, use the RALTER command:

```
RALTER  class_name  profile_name  UACC(READ)
```

To delete a resource profile, use the RDELETE command. For example:

```
RDELETE  class_name  profile_name  UACC(READ)
```

You can copy an access list from one profile to another by specifying the FROM operand on the PERMIT command:

```
PERMIT  profile_name  CLASS(class_name)
FROM(existing-profile_name)  FCLASS(class_name)
```

You can copy information from one profile to another by specifying the FROM operand on the RDEFINE or RALTER command:

```
RDEFINE  class_name  profile__name
FROM(existing-profile_name)  FCLASS(class_name)
```

Note: Do not plan to do this if you are using resource group names.

To list the names of profiles in a particular class, use the SEARCH command. The following command lists the profiles in the PRINTSRV class:

```
SEARCH CLASS(PRINTSRV)
```

2.4 Establishing SAF security with RACF

To accomplish security through SAF with RACF, you can do the following:

1. Activate generic processing before defining profiles, using the SETROPTS command.

2. Define profiles to protect the resources in the appropriate classes, using the RDEFINE command. (Classes are already defined for RACF. You must define them for other security products.)

3. Begin with generic profiles for broad access to resources, and then define generic or discrete profiles that are more restrictive.

4. Permit users to access appropriate profiles in each class with the necessary access levels, using the PERMIT command.

5. Activate the classes, using the SETROPTS command.

> **Tip:** To limit access, use the AOPSTART JCL procedure instead of the `aopstart` command to start Infoprint Server because you can associate a user ID with the AOPSTART JCL procedure.

2.4.1 Activating the FACILITY class

The FACILITY class can be used for a wide variety of purposes depending on the products installed on your system. If the FACILITY class is active, users might need access to particular resources to perform specific tasks. Therefore, they must have access based on the profiles protecting those resources.

For example, if you want IP PrintWay extended mode to write System Management Facilities (SMF) type 6 records, you must authorize the user ID that starts Infoprint Server daemons to write SMF records. To do this, give the user ID that starts Infoprint Server daemons READ access to the BPX.SMF profile in the FACILITY class.

You can control who can use certain UNIX functions when you define RACF profiles with UACC(NONE) to protect the appropriate BPX.* resources in the FACILITY class. Generally, authorized users need at least READ access to the BPX.* resources in order to use the UNIX function.

For security reasons, you may need to define the following FACILITY class profiles.

BPX.FILEATTR.APF
This controls which users are allowed to set the APF-authorized attribute in a z/OS UNIX file. This authority allows the user to create a program that will run APF-authorized. This is similar to the authority of allowing a programmer to update SYS1.LINKLIB or SYS1.LPALIB.

BPX.FILEATTR.PROGCTL
This controls which users are allowed to set the program control attribute. Programs marked with this attribute can execute in server address spaces that run with a high level of authority.

BPX.JOBNAME
This controls which users are allowed to set their own job names by using the _BPX_JOBNAME environment variable or the inheritance structure on spawn. Users with READ or higher permissions to this profile can define their own job names.

BPX.SMF
This checks whether the caller attempting to cut an SMF record is allowed to write an SMF record. It also tests if an SMF type or subtype is being recorded.

BPX.SUPERUSER
This allows users to switch to superuser authority.

BPX.UNLIMITED.OUTPUT
This allows users to use the BPX_UNLIMITED_OUTPUT environment variable to override the default spooled output limits for processes.

For a complete list see *z/OS UNIX System Services Planning*, GA22-7800, in "Setting up the BPX.* FACILITY class profiles".

2.4.2 Activating the JESSPOOL class

Because Infoprint Central lets users work with print jobs, you can use RACF to provide access to data sets that reside on spool. Using RACF allows users other than the owner of a data set to read, copy, print, or delete sensitive job data. When the JESSPOOL class is active, RACF ensures that only authorized users obtain access to job data sets on spool. Authorization to job data sets is provided through RACF user profiles. If there is no profile for a data set, only the user that created the data set can access, modify, or delete it.

SYSOUT application program interface (SAPI) applications, which are usually started tasks that process output to special devices (for example IP Printer, SNA Printer, PSF Printer, or E-Mail destinations), require at least UPDATE access to the spool data sets they process. If your installation has SAPI applications, and you activate the JESSPOOL class, you must either ensure that the SAPI applications have UPDATE access to appropriate JESSPOOL profiles, or define the applications as a started procedure with the trusted attribute. You can define them either in the STARTED class or in the RACF started procedures table. Otherwise, the SAPI applications cannot process output.

If you activate the JESSPOOL class in your installation, you must give IP PrintWay extended mode UPDATE access to profiles in this class so that IP PrintWay extended mode can select output data sets from the JES spool.

Examples

To define a broad profile to protect all print jobs on node N1, enter this RACF command:

```
RDEFINE JESSPOOL (N1.*.*.*.D*.*) UACC(NONE)
```

To give the AOPSTC user UPDATE access to the broad profile, enter these RACF commands:

```
PERMIT N1.*.*.*.D*.* CLASS(JESSPOOL) ID(AOPSTC) ACCESS(UPDATE)
SETROPTS RACLIST(JESSPOOL) REFRESH
```

> **Note:** The profiles that already exist in the JESSPOOL class should be suitable for use with Infoprint Central. However, be sure to give Infoprint Central users the appropriate access to those profiles

The JESSPOOL profile-name is a 6-part name with the following format:

```
local-nodename.userid.jobname.jobid.Ddsid.dsname
```

Where:

local-nodename   This is the NJE node ID of the JES2 or JES3 subsystem.

userid   This is the z/OS user ID of the job owner. For some output data sets that Print Interface or NetSpool allocates on the JES spool, this is either the user ID of the user who started the Infoprint Server daemons or BPXAS.

jobname   This is the job name. For some data sets that Print Interface or NetSpool allocates on the JES spool, this is the user ID of the user who started the Infoprint Server daemons or BPXAS.

Ddsid   This is the data set ID number that identifies the data set prefixed by the required letter D. The D character in the fifth qualifier of the profile

name distinguishes the data set's profile from other JESSPOOL profiles.

dsname   This is the data set name.

Table 2-1 lists the minimum access required to profiles in the JESSPOOL class.

Table 2-1   Minimum access required to profiles in the JESSPOOL class

Action in Infoprint Central	Access to this profile in the JESSPOOL class is required	This minimum access is required
Change priority	nodeid.userid.jobname.jobid.Ddsid.dsname	ALTER
Delete	nodeid.userid.jobname.jobid.Ddsid.dsname	ALTER
Edit properties	nodeid.userid.jobname.jobid.Ddsid.dsname	ALTER
Display	nodeid.userid.jobname.jobid.Ddsid.dsname	READ
Hold	nodeid.userid.jobname.jobid.Ddsid.dsname	ALTER
Move	nodeid.userid.jobname.jobid.Ddsid.dsname	ALTER
Release	nodeid.userid.jobname.jobid.Ddsid.dsname	ALTER
View log	nodeid.userid.jobname.jobid.Ddsid.dsname	READ
View properties	nodeid.userid.jobname.jobid.Ddsid.dsname	READ

2.4.3 Activating the OPERCMDS class

Infoprint Central lets users work with printers that IP PrintWay controls (called IP PrintWay printers) and with printers that PSF for z/OS controls (called PSF printers). You can protect IP PrintWay and PSF printers with profiles in the OPERCMDS class and PRINTSRV class.

You can control which groups of users can issue commands. Use RACF to authorize or restrict users from entering some or all commands, or specific variations of commands, or the consoles from which commands can be entered. To control the use of operator commands, create profiles in the OPERCMDS class that enable RACF command authorization.

> **Tip:** The profiles you have already defined in the OPERCMDS class to protect data sets on the JES spool should be suitable for use with Infoprint Central. If profiles already exist in the OPERCMDS class, give Infoprint Central users and the AOPOPER group the appropriate access to those profiles

Infoprint Central does not display or modify TSU print jobs because they are numerous and users typically do not print them. The minimum accesses needed to OPERCMDS class profiles are listed in Table 2-2.

Table 2-2   Minimum access required to profiles in the OPERCMDS class

Action in Infoprint Central	Access to this profile in the OPERCMDS class is required	This minimum access is required
Change priority	jesname.MODIFY.BATOUT jesname.MODIFY.STCOUT jesname.MODIFY.U	UPDATE

Action in Infoprint Central	Access to this profile in the OPERCMDS class is required	This minimum access is required
Delete	jesname.MODIFY.BATOUT jesname.MODIFY.STCOUT jesname.MODIFY.U	UPDATE
Edit properties	jesname.MODIFY.BATOUT jesname.MODIFY.STCOUT jesname.MODIFY.U	UPDATE
Display	jesname.MODIFY.BATOUT jesname.MODIFY.STCOUT esname.DISPLAY.U	READ
Hold	jesname.MODIFY.BATOUT jesname.MODIFY.STCOUT jesname.MODIFY.U	UPDATE
Move	jesname.MODIFY.BATOUT jesname.MODIFY.STCOUT jesname.MODIFY.U	UPDATE
Release	jesname.MODIFY.BATOUT jesname.MODIFY.STCOUT jesname.MODIFY.U	UPDATE
View log	jesname.MODIFY.BATOUT jesname.MODIFY.STCOUT jesname.DISPLAY.U	READ
View properties	jesname.MODIFY.BATOUT jesname.MODIFY.STCOUT esname.DISPLAY.U	READ

Unlike IP Printway printers, which are protected by the PRINTSRV class, you can define profiles in the OPERCMDS class to restrict who can perform actions on PSF printers. The actions and minimum accesses required to profiles in the OPERCMDS class are listed in Table 2-3. Profiles in the OPERCMDS class apply only to PSF printers and not to IP PrintWay printers.

Tip: In JES3 environments, you can also define profiles that apply just to one printer by specifying the printer name in the last qualifier of the profile.

Table 2-3   Printer actions and minimum access required to profiles in the OPERCMDS class

Action in Infoprint Central	OPERCMDS class profile in JES2	OPERCMDS class profile in JES3	Minimum access
Change forms	jesname.MODIFY.DEV	jesname.CALL.WTR jesname.RESTART.DEV.dev jesname.START.DEV.dev jesname.VARY.DEV	UPDATE
Change job selection	jesname.MODIFY.DEV	jesname.CALL.WTR jesname.RESTART.DEV.dev jesname.START.DEV.dev jesname.VARY.DEV	UPDATE
Find and display printers	jesname.DISPLAY.DEV	jesname.DISPLAY.D	READ

Action in Infoprint Central	OPERCMDS class profile in JES2	OPERCMDS class profile in JES3	Minimum access
Interrupt	jesname.INTERRUPT.DEV	jesname.RESTART.DEV.dev	UPDATE
Pause	jesname.HALT.DEV	n/a	UPDATE
Ping and run traceroute	jesname.DISPLAY.DEV	jesname.DISPLAY.DEV	READ
Repeat	jesname.REPEAT.DEV	jesname.REPEAT.DEV.dev	UPDATE
Reset	jesname.DISPLAY.DEV		READ
Space - backward	jesname.BACKSP.DEV	jesname.RESTART.DEV.dev	UPDATE
Space - forward	jesname.FORWARD.DEV	jesname.RESTART.DEV.dev	UPDATE
Start a printer	jesname.START.DEV	jesname.CALL.WTR esname.START.DEV.de jesname.VARY.DEV	UPDATE
Stop a printer (cancel the job)	jesname.STOP.DEV jesname.CANCEL.DEV	jesname.RESTART.DEV.dev jesname.CANCEL.DEV.dev	UPDATE
Stop a printer	jesname.STOP.DEV	jesname.RESTART.DEV.dev	UPDATE
View Properties	jesname.DISPLAY.D	jesname.DISPLAY.D	UPDATE

2.4.4 Activating the PRINTSRV class

The third RACF class used by Infoprint Server is PRINTSRV. If PRINTSRV is activated, you can define any profile in the PRINTSRV class. You can select any name for the profile that RACF allows. However, do *not* start the name with AOP, because profiles starting with AOP may conflict with profile names that IBM uses now or in the future. Profile names can be up to 64 characters in length.Table 2-4 lists the printer actions and minimum accesses required to profiles in the PRINTSRV class.

You can decide how printers are supposed to be protected by the PRINTSRV class. For example, you can define a separate profile to protect each printer, or you can define one profile to protect a group of printers or all printers. If you want to authorize different users to work with printers in different locations, define separate profiles for printers in each location. For example, you could define one profile for all printers in Poughkeepsie, and another profile for all printers in New York. If you want to authorize the same group of users to work with all printers, you need to define only one profile.

You must specify the name of the RACF resource profile in the operator-security-profile attribute of the printer definition that controls who can work with this printer using Infoprint Central. This attribute applies only to IP PrintWay extended mode.

Table 2-4   Printer actions and minimum access required to profiles in the PRINTSRV class

Action in Infoprint Central	OPERCMDS class profile in JES	Minimum access
Change forms (PSF only)	Profile specified in Printer Inventory	UPDATE
Change job selection (PSF only)	Profile specified in Printer Inventory	UPDATE
Find and display printers	Profile specified in Printer Inventory	READ
Interrupt (PSF only)	Profile specified in Printer Inventory	CONTROL

Action in Infoprint Central	OPERCMDS class profile in JES	Minimum access
Pause (PSF only)	Profile specified in Printer Inventory	CONTROL
Ping and run traceroute	Profile specified in Printer Inventory	READ
Repeat	Profile specified in Printer Inventory	CONTROL
Reset	Profile specified in Printer Inventory	CONTROL
Redirect - IP PrintWay printers only	Profile specified in Printer Inventory	CONTROL
Restore - IP PrintWay printers only	Profile specified in Printer Inventory	CONTROL
Space (PSF only)	Profile specified in Printer Inventory	CONTROL
Start a printer	Profile specified in Printer Inventory	CONTROL
Stop a printer and cancel the job	Profile specified in Printer Inventory	CONTROL
Stop a printer	Profile specified in Printer Inventory	CONTROL
View log	Profile specified in Printer Inventory	READ
View Properties	Profile specified in Printer Inventory	READ

If you define multiple profiles in the OPERCMDS, JESSPOOL, and PRINTSRV classes that apply to a print job, users must have access to the profiles in all classes to perform an action. However, Infoprint Central lets these users perform all actions on their own print jobs, regardless of whether they have access to the profiles that protect their print jobs.

> **Restriction:** The AOP.PRIORITY profile is an exception. If you define the AOP.PRIORITY profile, users must have UPDATE access to this profile to change the priority of their own print jobs.

After you have activated the PRINTSRV class in RACF, a member of the AOPOPER group and AOPADMIN group should also have a proper authorization in the profiles in PRINTSRV, as explained in the next section.

AOP.ADMINISTRATOR

The AOP.ADMINISTRATOR profile in the PRINTSRV class replaced the AOPADMIN profile in the FACILITY class. After you define the AOP.ADMINISTRATOR profile, Infoprint Server no longer checks the AOPADMIN profile.

The AOP.ADMINISTRATOR profile has two access levels:

READ   This level allows users to view the Printer Inventory using ISPF panels, Infoprint Central, or the Printer Inventory Definition Utility (PIDU). Users do not need READ access simply to list names of printer definitions with the `lpstat` command or with Infoprint Port Monitor.

UPDATE   This level allows users to update the Printer Inventory using ISPF panels or PIDU, and lets users view the Printer Inventory using Infoprint Central.

AOP.NETSPOOL

You can define the AOP.NETSPOOL profile to restrict who can display, start, and stop NetSpool LUs. If a user has UPDATE access to the AOP.ADMINISTRATOR profile, the AOP.NETSPOOL profile is not checked.

READ   This allows users to find and display LUs. The user can also view the log.

CONTROL   This allows users to display, start, and stop NetSpool LUs.

AOP.PRIORITY

If you define the AOP.PRIORITY profile, the job submitter and any other user with the required access to profiles in the OPERCMDS and JESSPOOL classes and an access level of READ in the AOP.PRIORITY profile can change the priority of a print job.

AOP.DAEMON

Infoprint Central does not allow users to start and stop daemons. However, you can define profile AOP.DAEMON to restrict who can display daemons. If you define profile AOP.DAEMON, an Infoprint Central user needs an access level of READ in the AOP.PRIORITY profile to display the status of daemons.

2.5 Controlling UNIX System Service environment

When you use IP PrintWay extended mode, you may need to control the amount of resources consumed. The resource limits for the majority of z/OS UNIX users such as Infoprint Server are specified in the BPXPRMxx PARMLIB member. Instead of assigning superuser authority to Infoprint Server so it can exceed BPXPRMxx limits, you can individually set limits for Infoprint Server daemons.

2.5.1 User profiles with OMVS segments

All users and programs that need access to z/OS UNIX System Service must have a RACF user profile defined, with an OMVS segment which has at least a UID specified. If the user ID assigned to the AOPSTART and AOPSTOP procedures is not a z/OS UNIX user, the Infoprint Server daemons will not start or stop, and you might not receive any error messages.

A RACF user profile has a segment called OMVS for z/OS UNIX support. A user ID must have an OMVS segment defined in order to use UNIX System Service. This segment has three fields, as explained here:

UID   This is a number from 0 to 16,777,215 that identifies a z/OS UNIX user. The user assigned to work with Infoprint Server must have a UID defined.

Home   This is the name of a directory in the file system. This field is optional.

Program   This is the name of a program that will be started for the user when the user begins a Z/OS UNIX session.

The RACF group also has a segment called OMVS to define z/OS UNIX groups. It contains only one field, as explained here:

GID   A number from 0 to 16,777,215 that identifies a Z/OS UNIX group.

You should define user AOPSTC with default group AOPOPER. You can select any name for the user ID, or you can alter an existing user ID to be a z/OS UNIX ID. You can select any

default group that has an OMVS segment and a GID. The user ID must be connected to the default group.

Infoprint Server user ID and group ID

```
ADDUSER AOPSTC OMVS(UID(user-identifier)
HOME('/u/aopstc')
     PROGRAM('/bin/sh')) DFLTGRP(AOPOPER) NOPASSWORD
```

User profile

Userid	Default Group	Connect Groups	TSO	DFP	OMVS		
AOPSTC	AOPOPER		...	...	UID 100	Home /u/aopstc	Program /bin/sh

```
ADDGROUP (AOPADMIN) OMVS(GID(group-identifier))
```

Group profile

Groupid	Superior Group	Connected Users		OMVS
AOPADMIN		...	...	GID 101

```
ADDGROUP (AOPOPER) OMVS(GID(group-identifier))
CONNECT (AOPSTC) GROUP(AOPOPER)
```

Group profile

Groupid	Superior Group	Connected Users		OMVS
AOPOPER		AOPSTC	...	GID 102

Figure 2-4   RACF user and group profiles

You need to define two groups to RACF to protect access to the Printer Inventory, the common message log, and Infoprint Server operator commands. You can choose any names for these groups. If you do not want to distinguish between administrators and operators, you need to define only one group.

AOPADMIN   This group is for Infoprint Server administrators, who can view and update the Printer Inventory and view all messages in the common message log.

AOPOPER   This group is for Infoprint Server operators, who can start and stop Infoprint Server daemons.

Define Infoprint Server administrators, operators, and other users whom you want to read the Printer Inventory to RACF as z/OS UNIX users. Connect Infoprint Server administrators and operators to the appropriate group.

2.5.2 Setting limits for z/OS UNIX users

You can control the amount of resources consumed by certain z/OS UNIX users by setting individual limits for these users. Instead of assigning superuser authority to Infoprint Server you can individually set higher limits for the user assigned to Infoprint Server. Setting user limits allows you to minimize the number of assignments of superuser authority at your installation and reduces your security risk.

CPUTIMEMAX   MAXCPUTIME is the time limit (in seconds) for processes that were created by rlogin and other daemons.The CPUTIMEMAX parameter overrides the MAXCPUTIME parameter.

ASSIZEMAX	MAXASSIZE is the maximum region size (in byte) for an address space. Use the RACF **ADDUSER** or **ALTUSER** command to specify the ASSIZEMAX limit on a per-user basis. The ASSIZEMAX parameter overrides the MAXASSIZE parameter.
FILEPROCMAX	Use MAXFILEPROC to determine the number of character-special files, /dev/fdxx, that a single process can have open concurrently. The FILEPROCMAX parameter overrides the MAXFILEPROC parameter.
PROCUSERMAX	MAXPROCUSER specifies the maximum number of processes that a single user (that is, with the same UID) can have concurrently active. The PROCUSERMAX parameter overrides the MAXPROCUSER parameter.
THREADSMAX	MAXTHREADS is the maximum number of threads that a single process can have active concurrently. The THREADSMAX parameter overrides the MAXTHREADS parameter.

```
OMVS INFORMATION
----------------
UID= 0000000100
HOME= /u/aopstc
PROGRAM= /bin/sh
CPUTIMEMAX= NONE
ASSIZEMAX= NONE
FILEPROCMAX= NONE
PROCUSERMAX= NONE
THREADSMAX= NONE
MMAPAREAMAX= NONE
```

Figure 2-5   Fields in OMVS segment

2.5.3 Controlling the number of processes and threads

The MAXPROCSYS statement specifies the maximum number of processes that z/OS UNIX System Services will allow to be active at the same time in the system. You may need to adjust the values for the MAXPROCSYS parameters in the BPXPRMxx parmlib member. Each component of Infoprint Server (that is, Print Interface, NetSpool, Transform, IP Printway extended mode, and Infoprint Central) may create additional processes, depending on the workload. Set the PROCUSERMAX to a reasonable value.

Threads provide support for multiple separate units of dispatchable work within a process. A z/OS UNIX thread can be compared with an MVS task. Threads allow for concurrent and asynchronous processing without the additional overhead associated with creating a new address space.

The MAXTHREADS value specifies the maximum number of pthread_create threads (including those running, queued, and exited but not detached) that a single process can have currently active. Specifying a value of 0 prevents applications from using pthread_create. The range is 0 to 100000; the default is 200.

The MAXTHREADTASKS value specifies the maximum number of MVS tasks created with pthread_create that a single user may have concurrently active in a process. The range is 0 to 32768; the default is 50.

Figure 2-6 on page 28 shows the difference between these two keywords, which is that MAXTHREADS specifies the limit for how many threads a process can have active. This

number includes the number of threads that are executing on MVS tasks and the number that are waiting for execution. MAXTHREADTASKS specifies the limit for how many MVS tasks can be created per process to schedule threads. This number limits the number of threads that can be executing at the same time in a process. In the pictured example, a process has created five threads, but only three MVS tasks, so two threads will be queued until a task becomes available.
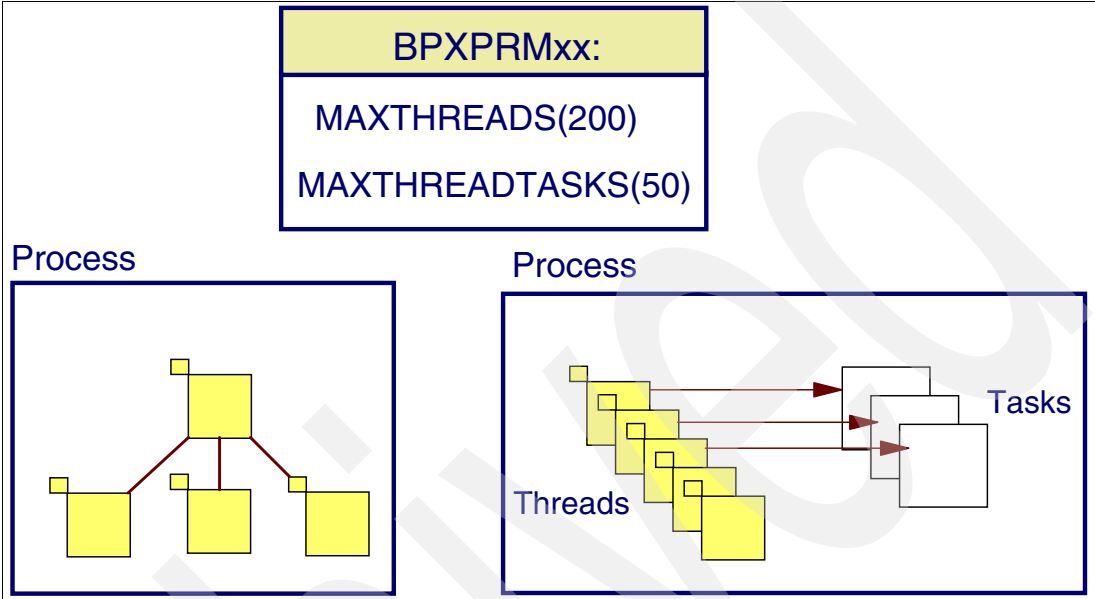
Figure 2-6   Controlling threads

Note: Infoprint Server allows customers to configure the MAXTHREADTASKS limit for programs that might create numerous concurrent threads. Some Infoprint Server programs require a minimum number of tasks to operate correctly.

Therefore, IBM recommends against specifying a value less than 32 for the AOPxxx_MAXTHREADTASKS or AOP_MAXTHREADTASKS environment variable.

If you do not specify either the AOPxxx_MAXTHREADTASKS environment variable for a program or the AOP_MAXTHREADTASKS environment variable, Infoprint Server uses a default value

Table 2-5   Environment variable

Environment variable	Program
AOPHINVD_MAXTHREADTASKS	aophinvd
AOPIPPD_MAXTHREADTASKS	aopippdxp / aopippd
AOPLPD_MAXTHREADTASKS	aoplpd
AOPNETD_MAXTHREADTASKS	aopnetd
AOPSDBD_MAXTHREADTASKS	aopsdbd
AOPSSID_MAXTHREADTASKS	aopssid
AOPSUBD_MAXTHREADTASKS	aopsubd
AOPWSMD_MAXTHREADTASKS	aopwsmd

Environment variable	Program
AOPOUTD_MAXTHREADTASKS	aopoutd

Each concurrent task requires the operating system to allocate additional storage, some of which must be below the 16 MByte line. If there are many current tasks, storage can become exhausted, which might cause the address space to end. Therefore, use caution in defining the AOPxxx_MAXTHREADTASKS and AOP_MAXTHREADTASKS environment.

3

Printer definitions

This chapter describes how to define printers in the Infoprint Server Printer Inventory. The Printer Inventory is a set of files in the z/OS UNIX file system that are maintained by the system administrator. The UNIX file system can be either HFS or zFS.

Printer Inventory is the central place for storing all information about printers known to all Infoprint Server subcomponents (Print Interface, IP PrintWay, and NetSpool). This means that the system administrator needs to define the printers only once.

The system administrator can also specify printer configuration information used by PSF in the same Printer Inventory, instead of in the PSF startup procedure or in a PSF exit. As a result, you can change PSF configuration information more easily because you only need to restart the printer whose configuration has changed.

The following topics are discussed in this chapter:

► Printer Inventory objects
► Printer Inventory Definition Utility (pidu)
► Adding printer definitions for:
  – IP PrintWay printers with different Protocols (LPR, IPP, VTAM, e-mail, direct socket)
  – PSF printer
  – General printer
► Displaying defined printers
► Modifying defined printers

3.1 Printer Inventory overview

The Printer Inventory Manager of Infoprint Sever controls the Printer Inventory. When Infoprint Server is started, it will create empty database files if they do not already exist in the directory pointed to by the *base-directory* attribute in the Infoprint Server configuration file (aopd.conf).

> **Note:** The printer Inventory cannot be shared by Infoprint Server running the same or different level on other systems.

Because a Printer Inventory might contain hundreds or thousands of printer definitions, changing information in many printer definitions can be time-consuming. Therefore, you might want to create objects in the Printer Inventory called components and include them in printer definitions.

You can create different types of objects in the printer inventory, as explained here:

Printway-fss objects   These contain information for an IP Printway basic mode FSS.

psf-fss objects   These contain configuration information for PSF for z/OS.

fsa objects   These contain information for an IP Printway basic mode FSA or a PSF for z/OS FSA.

allocation objects   These contain information used when Infoprint Server allocates a data set.

netspool-eof-rules objects   These contain information used by NetSpool to determine the end of a file (eof).

netspool-options objects   These contain information for additional NetSpool options.

printway-options objects   These contain information for additional IP PrintWay options.

processing objects   These contain information used while Infoprint Server processes a print job.

protocol objects   These contain information for the printer protocol being used.

printer objects   These contain information about printer and printer components.

printer-pool objects   These contain information about groups of printer definitions that you want to broadcast data to (applies only to NetSpool).

job-selection-rules objects   These contain rules that IP Printway extended mode uses to determine which print job to select from the JES spool for printing.

3.1.1 Components

A *component* contains attributes that are common to several printer definitions. You can define one or more components for each section of a printer definition, such as the Allocation section and the Processing section shown in Figure 3-1 on page 33. All attributes defined by these components are summed up to form a printer definition.

Note: Creating components is optional. Some printer definitions in the Printer Inventory might include components, while other printer definitions might not. Whether or not you use components, you can use the Printer Inventory Definition utility (PIDU) to make changes to many printer definitions at one time.

```
Add                    IP PrintWay Printer Definition
Command ==>  _____

Printer definition name  _____
Description . _____  (extend)
Location. . . _____  (extend)

                        Component name        Custom values
Section                 (enter to list)      (enter to customize)
Allocation        =>  _____        =>  __
Processing        =>  _____        =>  *
NetSpool options  =>  _____        =>  __
NetSpool end-of-file  =>  _____        =>  __
IP PrintWay options  =>  _____        =>  __
Protocol          =>  _____        =>  *

_ Use DEST, CLASS, and FORMS for IP PrintWay printer selection
NetSpool LU name . _____    LU classes . . __  __  __  __  __  __  (extend)
```

Figure 3-1   IP PrintWay Printer Definition panel showing Allocation, Processing and Components

Component names

Components are named and contain attributes (such as Data format) that Print Interface, NetSpool, and IP PrintWay use to process data and validate that a job can print on this printer. Component definitions are not required; you can also use the Custom values field to specify these attributes. If you do not specify a component or custom values, default values are used.

Because a Printer Inventory might contain hundreds or thousands of printer definitions, changing information in many printer definitions can be time-consuming. Therefore, you might want to create additional objects in the Printer Inventory called components and include them in printer definitions. Consider creating components when several printer definitions share the same attributes.

To use components:

► Specify the shared attributes in a component, instead of specifying the same attributes in many printer definitions.

► Include the component in all printer definitions to which those attributes apply.

Creating components

To create a component, place the cursor on the Component name field, as shown in Figure 3-1. Press Enter to do one of the following:

► Create custom value fields for the new component

► View custom values and values specified in the named component

► Specify attributes that are not specified in the named component

► Override attributes that are specified in the named component

> **Note:** When you create components, you do not need to specify every attribute in that component. Instead, you might want to specify some attributes in the printer definitions. For example, the Protocol component contains an attribute that defines the IP address of the remote printer. Because the IP address is usually unique for each remote printer, you could omit the IP address from the component and instead specify it in the printer definition.
>
> When you include components in a printer definition, you can override some of the attributes specified in the components by specifying a different value in the printer definition itself.

3.1.2 Infoprint Server components

In this manner you can create a single set of printer definitions that all the components of Infoprint Server use. Components of Infoprint Server where components can be used are:

► NetSpool
► Print Interface
► IP PrintWay
► The SNMP subagent
► Infoprint Central
► PSF for z/OS, as an option

3.2 Utility programs

The Printer Inventory Definition Utility (PIDU) program can be used to manage objects in the Printer Inventory. Inventory objects include printer definitions, printer pool definitions, components, FSS definitions, FSA definitions, and job selection rules.

The PIDU program is useful for creating and editing many objects at the same time. Also, it allows you to perform functions that you cannot perform from Infoprint Server ISPF panels. For example, you can export or dump objects in the Printer Inventory to a file, and you can perform more powerful searches of the Printer Inventory.

You can use the `pidu` program as a batch job from TSO by using the AOPBATCH utility. The PIDU program is useful for creating and editing many objects at the same time.

You can run the PIDU program in two ways:

► From the z/OS UNIX shell using the `pidu` command
► As a batch job

When using the PIDU program, you can specify the following PIDU commands to manage objects in the Printer Inventory:

► create
► delete
► display
► dump
► export
► force-create
► list
► modify
► rename

3.2.1 Using the AOPBATCH utility

The AOPBATCH utility program is provided by Infoprint Server. AOPBATCH lets you use MVS JCL to run the pidu utility. IBM recommends that you use AOPBATCH instead of BPXBATCH to run pidu provided by Infoprint Server because AOPBATCH sets default values for the PATH, LIBPATH, and NLSPATH environment variables that are suitable for installations that installed Infoprint Server files in default locations. Also, AOPBATCH lets *stdin* be read from a DD statement and lets *stdout* and *stderr* be written to a DD statement.

With AOPBATCH, you can specify the optional DD statements to set up the z/OS UNIX environment and to allocate the STDERR, STDIN, and STDOUT files.

> **Note:** The STDIN, STDOUT, and STDERR statements are suitable only for text data.

Figure 3-2 shows how to use the AOPBATCH program. The example JCL invokes the Infoprint Server PIDU program. The PIDU program is useful for creating and editing many objects at the same time.

```
//AOPBATCH JOB .......
//PIDU     EXEC PGM=AOPBATCH,PARM='pidu'
//STDIN    DD *
list printer;
/*
//STDOUT   DD   SYSOUT=*
//STDERR   DD   SYSOUT=*
//STDENV   DD   *
PATH=/usr/lpp/Printsrv/bin:/bin:/usr/bin
LIBPATH=/usr/lpp/Printsrv/lib:/lib:/usr/lib
NLSPATH=/usr/lpp/Printsrv/%L/%N:/usr/lpp/nls/msg/%L/%N
/*
```

Figure 3-2   AOPBATCH program JCL example

Where**:**

```
EXEC PGM=AOPBATCH,PARM='program_name options'
```

PARM=   This specifies a program name and options.

pidu - The Printer Inventory Definition Utility program; this utility is provided with Infoprint Server to help you to create printer inventory entries.

options:

-q - This suppresses informational messages that the **pidu** command writes to the output data set named in the STDOUT DD statement.

-v - This writes the name of the Printer Inventory to the output data set named in the STDERR DD statement, and provides additional informational messages.

> **Note:** Infoprint Server must be started before you run the **pidu** command.

STDENV   This specifies environment variables for use by program *program_name.* You can specify the environment variables in-stream in the JCL, in an HFS file, or in an MVS data set. Specify the environment variables in the format *variable = value*, with only one environment variable on each line or record.

If you omit the STDENV DD statement or do not specify one of the following environment variables, AOPBATCH sets the following 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/%L/%N:/usr/lib/nls/msg/%L/%N

AOPBATCH also sets the HOME environment variable to the user's home directory and sets the LOGIN variable to the user ID.

STDERR This specifies a SYSOUT data set, an HFS file, or an MVS data set.

STDIN This specifies input to the program. You can specify input in-stream in the JCL, in an HFS file, or in an MVS data set.

STDOUT This specifies a SYSOUT data set, an HFS file, or an MVS data set.

> **Note:** AOPBATCH is installed in SYS1.LINKLIB; therefore, you do not need to include a STEPLIB DD statement in your JCL.

3.3 FSS definitions for IP Printway basic mode

You can create FSS definitions for IP Printway basic mode. All attributes are optional and they do not apply to IP Printway extended mode. However, if you decide to define a FSS definition, then the name of this definition should match the name of the JES FSS definition for the IP PrintWay basic mode startup procedure; see Figure 3-3.

```
create printway-fss PWFSS
       concatenation-separators =
       default-document-codepage =
       maximum-hiperspace-blocks =
       national-language =
       old-style-translation =
       tcpip-job-name =
       trace-table-size =
       trace-prompt =
       trace-mode =
       applid =
       description = "Defines a IP Printway basic mode FSS object"
;
```

Figure 3-3 Syntax to create a printway-fss object

A printway-fss definition is optional, except when you need attribute values which differ from the defaults. For example, the FSS shown in Figure 3-3 is used for a VTAM printer.

3.4 FSS definition for a PSF functional subsystem

PSF for z/OS users can define printer initialization parameters, trace parameters, and optional functions in the Printer Inventory instead of in the PSF startup procedure and

installation EXIT 7. All attributes are optional. You would otherwise include these parameters in the PARM field of the EXEC statement of the PSF startup procedure. The name of the psf-fss must equal the name of the JES FSS definition.

```
create psf-fss PSFFSS
       nst-trace-dsname =
       unicode-enabled =
       tcpip-job-name =
       trace-table-size =
       trace-prompt =
       description = "Defines a PSF functional subsystem object"
;
```

Figure 3-4   Syntax to create a psf-fss object

3.5 FSA definitions for PSF and IP Printway basic mode

IP PrintWay does not require any attributes in an FSA definition. However, when you create an FSA definition for IP Printway basic mode, only three attributes are valid. This object is rarely needed for IP Printway basic mode.

```
create fsa PRT1
       fsa-type =
       trace-mode =
       description = "Defines a IP PrintWay FSA object"
;
```

Figure 3-5   Syntax to create an fsa object for IP Printway

Using the Printer Inventory avoids the need to restart all PSF printers in the startup procedure when you change parameters. Only the printer for which parameters are changed needs to be restarted. This object is optional, however, if defined for PSF, you can use Infoprint Central to display the properties of a PSF printer, or to determine the status of a PSF printer. Infoprint Central can also be used for normal PSF printer operation. You can change job-selection criteria for PSF printers. You can also start, stop, space, interrupt, pause (JES2), and ping a PSF printer.

Note: You must create FSS and FSA definitions for PSF if you configure PSF to use the Printer Inventory.

The psf-fsa object is very extensive because it represents an attribute for every PSF PRINTDEV Statement, as well as for many of the functions which could otherwise only be enabled by using EXIT7. Change the PSF printer startup procedure to specify INV=name as the first parameter in the PARM field of the EXEC statement, as shown here:

```
// DD1            EXEC PGM=APSPPIEP,PARM=('INV=name')
```

You must specify the name of the Printer Inventory in the inventory attribute (which by default is AOP1) in the Infoprint Server configuration file (aopd.conf). The INV=name parameter indicates that PSF uses the Printer Inventory and obtains parameters from the specified Printer Inventory for each printer in the startup procedure. No other parameters in the PARM field are used when PSF uses the Printer Inventory.

When defined, PSF takes all fsa object attributes from the printer inventory. However, it can also take them from the PSF startup procedure if they were not defined by the fsa object in the printer inventory yet. Figure 3-6 on page 39 displays the syntax to create an fsa object.

```
create fsa PRT2
        acknowledgement-level =
        applid =
        blank-compression =
        capture-inline-resources =
        channel-buffer-count =
        chars =
        close-libraries-when-idle =
        color-map =
        com-setup-member =
        consolidate-im1-image =
        cse-check-fit =
        cse-orientation =
        cse-preserve-page-position =
        cse-sheet-eject =
        default-process-mode =
        disconnect-action =
        dump-code =
        dump-message-id =
        eject-to-front-facing =
        end-sna-conversation =
        error-disposition-supported =
        failure-action =
        form-definition =
        fsa-trace-dsname =
        fsa-type =
        global-overlay =
        inhibit-recovery =
        input-tray-substitution =
        interrupt-message-page =
        interrupt-message-page-copies =
        issue-intervention-message =
        issue-setup-message =
        label-data-pages =
        label-separator-pages =
        location =
        logmode =
        luname =
        map-to-outline-font =
        mark-interrupt-message-page =
        message-count-before-dump =
        no-response-action =
        no-response-notify =
        offset-interrupt-message-page =
        offset-stacking =
        operator-security-profile =
        override-3800-default-font =
        page-definition =
        port-number =
        print-error-messages =
        print-error-messages-maximum =
```

```
                    print-error-reporting =
                    printer-acquire-interval =
                    printer-connect-interval =
                    printer-disconnect-interval =
                    printer-ip-address =
                    printer-management-mode =
                    printer-release-interval =
                    printer-release-mode =
                    prune-double-byte-fonts =
                    prune-single-byte-fonts =
                    psf-send-default-character =
                    recover-from-font-not-found =
                    release-ds-when-repositioning =
                    resolution =
                    response-timeout =
                    restrict-printable-area =
                    retained-fonts =
                    retained-form-definitions =
                    retained-object-container =
                    retained-page-definition =
                    retained-page-segments =
                    save-printer-information =
                    send-messages-to-sysout =
                    set-3800-dataset-header-origin =
                    set-3800-dataset-origin =
                    set-3800-job-header-origin =
                    set-3800-job-trailer-origin =
                    set-3800-messages-origin =
                    snmp-reporting =
                    suppress-copy-marks =
                    trace-table-size =
                    trace-mode =
                    description = "Defines a PSF FSA object"
;
```

Figure 3-6   Syntax to create an fsa object

If defined, PSF requires at least a form-definition attribute and a page-definition attribute.
Also, depending on the fsa-type attribute, you must also specify printer-ip-address, or luname
and applid. However, your PSF installation might need more predefined attributes in order to
function properly.

Note: The fsa object name must equal the JES printer name.

3.6 Attributes for the allocation object class

The allocation object represents output-descriptors, which are used for new data sets. These
attributes are equivalent to parameters of the OUTPUT JCL statement. Use these attributes
to specify processing options for Infoprint Server print data sets. That is, these attributes
become part of the data set output characteristics for the processing of the data set when it
finally resides on the JES spool. No attributes are required. However, if you plan to use Print
Interface or NetSpool, you must specify the attributes that correspond to a job-selection-rule

or to the JES work-selection criteria defined for the program (IP PrintWay, PSF, JES, and so on) that you want to process the output data sets from the JES spool.

Note that some print-submission methods allow users to specify the same attributes that you can specify in an allocation object, and not all attributes in this allocation object can be applied to all printers in the printer inventory. Figure 3-7 on page 41 displays the syntax to create an allocation object.

```
create allocation default
        address-text =
        afp-parameters =
        building-text =
        burster-trimmer-stacker =
        chars =
        checkpoint-pages =
        checkpoint-seconds =
        color-map =
        com-setup-member =
        copies =
        copy-group =
        department-text =
        destination =
        duplex =
        error-disposition =
        flash-count =
        flash-name =
        form-definition =
        forms =
        forms-control-buffer =
        group-identifier =
        hold =
        input-tray-number =
        jes-form-length =
        jes-maximum-line-count =
        jes-node =
        jes-priority =
        jes-threshold =
        jes-writer =
        label-data-pages =
        name-text =
        normal-output-disposition =
        notify =
        output-bin-number =
        outpu-class =
        overlay-back =
        overlay-front =
        page-definition =
        print-error-messages =
        print-error-messages-maximum =
        print-error-reporting =
        process-mode =
        resolution =
        resource-directories =
        resource-library =
        restrict-printable-area =
```

```
                    room-text =
                    save-afp-statistics =
                    segment-pages =
                    table-reference-characters =
                    title-text =
                    universal-character-set =
                    userdata =
                    x-image-shift-back =
                    x-image-shift-front =
                    y-image-shift-back =
                    y-image-shift-front =
                    description = "Defines a default allocation object"
;
```

Figure 3-7   Syntax to create an allocation object

When you specify `dcf-routing = yes`, IP PrintWay uses destination, output-class, and forms, if specified, for printer selection. This is important in terms of users submitting via JCL to Infoprint Server. (Note that dcf-routing is an abbreviation of DestinationClassForms-routing.)

> **Note:** The combination of destination, output-class, and forms must be unique in all printer definitions, which means that no other printer can have the same exact combination of these three attributes.

3.7 Attributes for the processing object class

Attributes specified in the processing object are used by Print Interface, IP PrintWay, and NetSpool to process print data and to validate for you that each print job can print on this printer. Figure 3-8 on page 42 displays the syntax to create a processing object.

Attributes in this object can be divided into two subcategories: validation attributes, and processing attributes, as explained here:

► Validation attributes

   Some attributes are taken by InfoPrint Server to *validate* each print job and the print data stream, and to make sure the print stream can print on the printer selected by the user. If the validation fails for a print job, then Infoprint Server rejects the print request.

   Validation options may help you to better utilize printers. For example, they can help to prevent the selection of a printer that is unsuitable for a print job.

► Processing attributes

   Some attributes are taken by InfoPrint Server to *process* each print job and its print data stream. These are attributes which control data stream transformation, data stream encryption, and page formatting.

   Having the wrong processing attributes is often the cause for faulty printouts that nobody wants to see; for example, the document-codepage attribute could not represent the code page which was used as the document was created. Even each program specified in the *filter* attribute could break a printout down.

```
create processing default
        db-translate-table =
        document-codepage =
        document-format-supported =
        duplexes-supported =
        filters =
        forms-supported =
        input-tray-map =
        maximum-copies =
        maximum-document-size =
        output-bin-map =
        pcl-line-density =
        pcl-orientation =
        pcl-print-density =
        pdf-encryption-level =
        pdf-owner-identifier =
        pdf-protect =
        pdf-user-identifier =
        print-error-reporting-supported =
        print-page-header =
        printer-codepage =
        printway-bottom-margin =
        printway-page-height =
        printway-pagination =
        printway-sosi-mode =
        printway-top-margin =
        resubmit-for-filtering =
        scs-automatic-page-orientation =
        scs-bottom-margin =
        scs-horizontal-tabs =
        scs-left-margin =
        scs-maximum-line-length =
        scs-maximum-page-length =
        scs-right-margin =
        scs-top-margin =
        scs-vertical-tabs =
        translation-dataset-qualifier =
        description = "Defines a processing object"
;
```

Figure 3-8   Syntax to create a processing object

No attributes are required. However, you might need to specify the printer-codepage and document-codepage attributes in order for some data formats to print correctly.

3.8 Attributes for the netspool-eof-rules object

Due to the complexity of the other attributes that are valid for the netspool-eof-rules object class, IBM recommends that you use the Infoprint Server ISPF panels to specify end-of-file rules. All attributes are optional. Figure 3-9 on page 43 displays the NetSpool eof-rules default.

```
create netspool-eof-rules default
        description = "Defines a very complex object"
;
```

Figure 3-9   NetSpool eof-rules default

3.9 Attributes for the NetSpool-options object

All attributes are optional. The NetSpool-options object, if defined, might help you to fulfill special requirements of an installation; Figure 3-10 shows the default.

```
create netspool-options default
        default-owner =
        embedded-attributes-prefix =
        maximum-record-size =
        netspool-formatting =
        recfm =
        description = "Defines a netspool-options object'
;
```

Figure 3-10   NetSpool options default

3.10 Attributes for the printway-options object

The printway-options object attributes define how IP PrintWay is to process data prior to transmission to a remote system, how long to wait for a response from the remote system, and how long to retain data sets on the JES spool after successful or unsuccessful transmission. These attributes apply to all of the transmission protocols that IP Printway supports. Figure 3-11 on page 44 displays the syntax to create a printway-options object.

Use caution when you specify a retention period. IP PrintWay basic mode needs a few bytes of storage for each printout. An S878 or $F02 abend code might be seen after IP Printway has used up all storage. If you need a large retention period, run IP Printway extended mode.

```
create printway-options default
        automatic-dataset-grouping =
        begin-dataset-exit =
        carriage-control-type =
        connection-timeout =
        dataset-grouping =
        delete-form-feed =
        document-header =
        document-trailer =
        end-dataset-exit =
        failure-retention-period =
        line-termination =
        omit-line-termination-at-eof =
        printway-formatting =
        printway-postscript =
        record-exit =
        response-timeout =
        retry-limit =
        retry-time =
        successful-retention-period =
        translate-document-header =
        translate-document-trailer =
        transparent-data-character =
        description = "Defines a printway-options object"
;
```

Figure 3-11   Syntax to create a printway-options object

3.11 Attributes for the protocol object

The required and optional attributes depend on the value you select for the *protocol-type* attribute. IP PrintWay supports five types of protocols to print data to IP Printway defined printers in the printer inventory, as listed in Table 3-1.

Table 3-1   Required and optional protocol attributes

Protocol-type attribute	Required attributes	Optional attributes
lpr	printer-ip-addresses print-queue-name	lpr-xxxx owner, server-user-options
ipp	printer-uri	
vtam	printer-luname	printer-logmode vtam-checkpoint-pages vtam-send-as-transparent
e-mail	mail-to-addresses	mail-bcc-addresses mail-cc-addresses mail-from-addresses mail-replay-address

Protocol-type attribute	Required attributes	Optional attributes
direct-sockets	printer-ip-addresses port-number	page-accounting page-restart

The operator-security-profile attribute and the description attribute are optional for all supported protocol types. You can specify attributes either in the printer definition or in an included protocol component. That is, when you create a protocol object, no attributes are required. However, when you create a printer definition, then you must also create protocol-type attributes. Figure 3-12 displays the protocol object default.

```
create protocol default
        lpr-banner-class =
        lpr-banner-job-name =
        lpr-filename =
        lpr-indent =
        lpr-mode =
        lpr-optimize-copies =
        lpr-print-banner =
        lpr-print-function =
        lpr-restrict-ports =
        lpr-title =
        lpr-width =
        mail-bcc-addresses =
        mail-cc-addresses =
        mail-from-name =
        mail-reply-address =
        mail-to-addresses =
        operator-security-profile =
        owner =
        page-accounting =
        page-restart =
        port-number =
        print-queue-name =
        printer-ip-address =
        printer-logmode =
        printer-luname =
        printer-uri =
        protocol-type =
        server-user-options =
        vtam-checkpoint-pages =
        vtam-send-as-transparent =
        description = "Defines a protocol object"
;
```

Figure 3-12   Protocol object default

3.12 Attributes for the printer object

When you define printers in the Printer Inventory for users, you must create at least one printer definition to represent each needed protocol type. However, to satisfy some printing requirements, you may need to set up different configurations of printer definitions for the

same printer. Another common approach is to use different sets of Job Control Language (JCL) to submit print requests because submitted JCL can override almost every attribute.

Most of the attributes that you can specify in a printer object are divided into logical groups. Each group represents a printer inventory object which can be included; see Figure 3-13. The six groups of objects are:

► Allocation
► Processing
► NetSpool end-of-file rules
► NetSpool options
► IP Printway options
► Protocol

```
create printer prt
       dcf-routing =
       general-spooling-mode =
       location =
       lu-classes =
       luname =
       printer-type =
       include-allocation =
       include-netspool-eof-rules =
       include-netspool-options =
       include-printway-options =
       include-processing =
       include-protocol =
       description = "Defines a printer object"
;
```

Figure 3-13   Create a printer

In addition to these attributes, you can also specify attributes that are valid for other objects. However, some objects and their attributes are valid only for certain printer types, as defined by the *printer-type* attribute.

3.13 Attributes for a printer-pool object

NetSpool requires an lu-class, luname, and printer-names attribute; see Figure 3-14. All other attributes are optional.

```
create printer-pool broadcast
       printer-names =
       lu-classes =
       luname =
       default-owner =
       embedded-attributes-prefix =
       include-netspool-eof-rules =
       description = "Defines a printer pool for NetSpool"
;
```

Figure 3-14   Create printer-pool

3.14 Attributes for a job-selection-rule

IP PrintWay extended mode uses the job selection rules defined in the Printer Inventory to determine which print jobs to select from the JES spool for printing. You must create at least one job selection rule in order for IP PrintWay extended mode to select print jobs.

All job selection rules are managed by aopwsmd in its own address space. Figure 3-15 displays the syntax to create a job selection rule.

```
create job-selection-rule NewRule
       job-selection-status =
       output-class-list =
       creator-userid =
       dest-ip-address =
       destination-pattern =
       forms-list =
       jes-writer-pattern =
       operator-security-profile =
       description = "Deefines a job selection rule" ; '
;
```

Figure 3-15   Syntax to create a job selection rule

Be aware that job selection rules only apply to IP Printway extended mode.

> **Note:** All attributes are optional. If you do not specify any attribute, then IP PrintWay selects all output data sets.

You do not have to create a job selection rule which contains all sub-parameters. In most cases a simple job section rule that only selects data from a single JES class can be used; see Figure 3-16.

```
create job-selection-rule NewRule
       output-class-list = P
       description = "Select print jobs in Class P" ; '
;
```

Figure 3-16   Create a job selection rule

Each rule is a thread managed by the work selection manager, and it can be enabled or disabled. AOPWSMD_MAXTHREADTASKS limits the number of active job-selections rules. The attributes of the print job must match all values in a rule to be selected.

3.15 The default printer definition

In this section we explain how to define a simple printer. If you only specify the printer IP address on an OUTPUT JCL statement without any printer definition, IP Printway can use values specified in its default printer definition. The name of the IP PrintWay default printer is DFLTNTRY.

3.15.1 Batch job submission

To transmit output from a batch job to an IP Printway printer, use the DEST=IP: OUTPUT JCL statement. Figure 3-17 shows how to verify that IP Printway has enabled a job selection rule.

```
KGOE @ SC74:/u/kgoe>pidu -c 'list job-selection-rule;'

# list job-selection-rule
NewRule
KGOE @ SC74:/u/kgoe>pidu -c 'display job-selection-rule NewRule;'

# display job-selection-rule NewRule
   output-class-list = {
       F
   }
   description = "Select print jobs in class P"
KGOE @ SC74:/u/kgoe>
 ===>
                                                                          INPUT
```

Figure 3-17   Verify the job selection rule

You need to know the IP PrintWay output selection criteria. As shown in Figure 3-17, only JES output class F will be selected by IP PrintWay extended mode. After Infoprint Server is running, a user can submit JCL to print on any attached printer; there are no definitions necessary. However, the user must know the IP address and the queue name of the line printer daemon (LPD) which can run on a server like Windows or on a real printer.

```
//KGOE#00  JOB   (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUID
//*
//* print to DFLTNTRY
//*
//PW       OUTPUT NOTIFY=&SYSUID,
//         DEST='IP:9.12.4.87',
//         PRTQUEUE='raw'
//PRINT    EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSIN    DD DUMMY
//SYSUT2   DD SYSOUT=(P,TESTWTR),OUTPUT=(*.PW)
//SYSUT1   DD *
Hello

here am I. This is your Infoprint Server who
has printed that for you.

§ 1 - When something is wrong, write
      an e-mail to Infoprint@help.com

Regards, Infoprint Server
/*
```

Figure 3-18   Using the default printer definition DFLTNTRY to print

To submit a print data set to an IP PrintWay printer for which your system administrator has not created a printer definition, specify a value for the DEST=IP: parameter on the OUTPUT JCL statement, as shown in Figure 3-18 on page 48. This value is the IP address or host name of the printer or the system to which the printer is attached. When you specify DEST=IP: you must also specify a value for either the PRTQUEUE parameter or the PORTNO parameter.

However, you may determine that some characters are being not printed correctly. This is because IP PrintWay had to use a default *document-codepage* attribute (IBM-1047) and a default *printer-codepage* attribute (IBM-850). Remember, no printer definition has been made yet. So at this point, you will have to start making definitions.

```
KGOE @ SC74:/u/kgoe>pidu
PIDU (AOP1)
> list printer;
> create printer DFLTNTRY;
AOP062I printer DFLTNTRY was created.
> modify printer DFLTNTRY printer-codepage=ISO8859-1;
AOP063I printer DFLTNTRY was replaced.
>modify printer DFLTNTRY document-codepage=IBM-273;
AOP063I printer DFLTNTRY was replaced.
> display printer DFLTNTRY;
   printer-codepage = ISO8859-1
   document-codepage = IBM-1047
> exit

KGOE @ SC74:/u/kgoe>
 ===>
                                                                    RUNNING
```

Figure 3-19   Using the pidu utility to create a default printer

As you can see in Figure 3-19, the job was encoded in IBM-273 and the LPD decoded in ISO8859-1. Therefore, you need to modify those code pages in order to print without errors.

3.16 Objects and attributes

Not all attributes in a printer definition need to be specified, because Infoprint Server and JES supply default values for many of the attributes. Some attributes are used by all printer types of Infoprint Server; other attributes are used only by certain printer types.

These attributes can be divided into three groups:

► Attributes that are only taken from the printer inventory

► Attributes that can be overwritten by a OUTPUT JCL statement

► Attributes that can be transferred to another print server

Attributes are combined into components, and components are combined into printer definitions, although you can always overwrite every attribute on a higher level. That is, when you include components in a printer definition, you can override attributes specified in the components by specifying a different value in the printer definition itself. Notice, however, that if you override an attribute in a printer definition, the printer definition does not pick up the new attribute even though it was changed in the component.

Creating objects called components is optional. You might want to create additional objects in the Printer Inventory and include them in printer definitions; see Figure 3-20. When you create an object, you do not need to specify every attribute in that component. Consider creating components when several printer definitions share the same attributes.
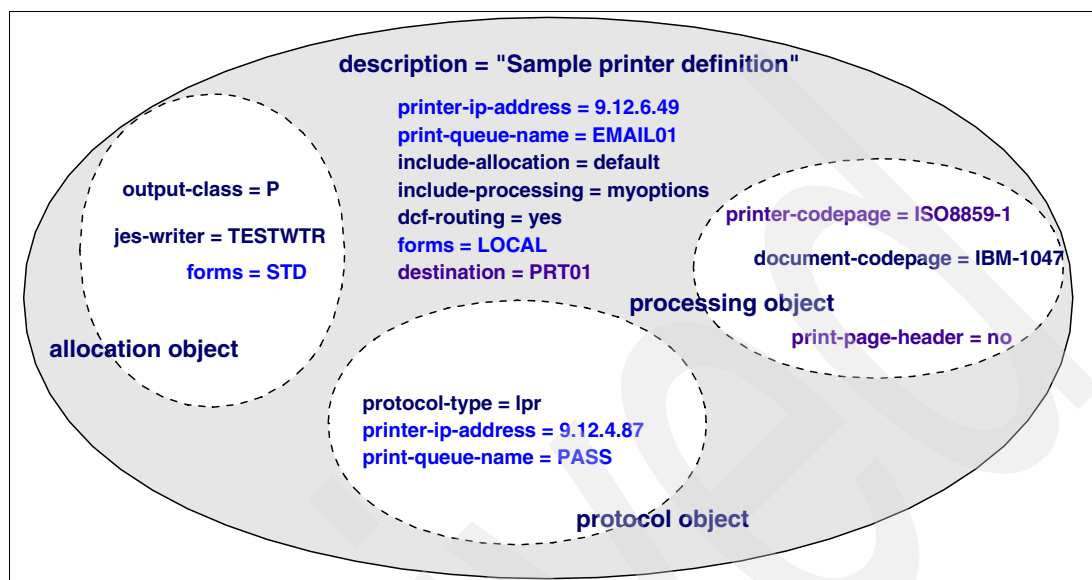
Figure 3-20   Sample printer definition

3.16.1 A printer object in the Printer Inventory

Each printer object in the Printer Inventory is a collection of objects and attributes. All objects must be defined before they can be added to a printer object. Figure 3-20 shows an example. To create this printer object you must first create every object that should be included. Every existing object can be included; however, you must override each attribute that does not fit your requirements. So, sometimes it may be better to create a new object instead of using an existing one.

Allocation object

You can specify attributes in the allocation object of a printer definition to tell Infoprint Server how to allocate output data sets on the JES spool. For example, you can specify the JES output class, forms name, and JES writer name. Some of the attributes apply only if the printer is of a certain type.

As an alternative to specifying attributes in the allocation object, job submitters can specify Infoprint Server job attributes and application programmers can embed job attributes in the VTAM application data sent to NetSpool. There is no definitive rule about what should be specified in here. A sample job as shown in Figure 3-21 on page 51 specifies three attributes.

```
//KGOE#01  JOB   (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUI
//CREATE  EXEC PGM=AOPBATCH,PARM='pidu'
//STDOUT   DD SYSOUT=*
//STDERR   DD SYSOUT=*
//* STDENV may point to your environment variables
//STDIN    DD *
create allocation alloc01
      output-class = P
      jes-writer = TESTWTR
      forms = STD
;
/*
```

Figure 3-21   Sample job to create a allocation object

Processing object

You can specify attributes in the processing object of a printer definition to tell Infoprint Server how to treat output data sets. For example, to control data stream transformation you can specify the document-codepage, printer-codepage, and print-page-header attributes. Job submitters can specify Infoprint Server job attributes to override attributes here. The rule is that you specify at least those attributes which you cannot override dynamically.

```
//KGOE#02 JOB   (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUID
//CREATE  EXEC PGM=AOPBATCH,PARM='pidu'
//STDOUT   DD SYSOUT=*
//STDERR   DD SYSOUT=*
//* STDENV may point to your environment variables
//STDIN    DD *
create processing process01
      document-codepage = IBM-1047
      printer-codepage = ISO8859-1
      print-page-header = no
;
/*
```

Figure 3-22   Sample job to create a processing object

Printway-options object

You can define how Infoprint Server is to process data prior to transmission to a remote system, how long to wait for a response from the remote system, and how long to retain data.

You may want to add printer-specific data that IP PrintWay includes at the beginning of the document and sends to the remote printer or print server. For example, there is an attribute where you might specify printer commands to change the printer default font.

IP PrintWay does not include any data at the beginning of a document, so make sure that all commands specified here are accepted by the printer. If you specify a *document-header* attribute and *translate-document-header=yes,* then IP Printway translates your data from *document-codepage* to *printer-codepage*. So use care regarding which code page is taken, if you do not enter the values in hexadecimal format.

```
//KGOE#03 JOB   (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUID
//CREATE  EXEC PGM=AOPBATCH,PARM='pidu'
//STDOUT   DD SYSOUT=*
//STDERR   DD SYSOUT=*
//* STDENV may point to your environment variables
//STDIN    DD *
create printway-options opt01
      retry-limit = 5
      retry-time = 0000:10:00
      document-header = "<esc>E<esc>&l10<esc>(s17H"
      translate-document-header = yes
      document-trailer = "<esc>E"
      translate-document-trailer = yes
;
/*
```

Figure 3-23   Sample job to create a printway-options object

Protocol object

You can specify attributes in the protocol object of a printer definition to tell Infoprint Server what kind of protocol Infoprint Server should use; see Figure 3-24. If you are going to use protocols other than LPR (for example, VTAM, PSF, EMAIL, and so on), then you must define these protocols here. The required and optional attributes depend on the value you select for the *protocol-type* attribute. Depending on the protocol, Infoprint Server also decides which objects can be included. For example, a PSF printer does not have a printway-options object included.

```
//KGOE#04 JOB   (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUID
//CREATE  EXEC PGM=AOPBATCH,PARM='pidu'
//STDOUT   DD SYSOUT=*
//STDERR   DD SYSOUT=*
//* STDENV may point to your environment variables
//STDIN    DD *
create protocol prot01
      protocol-type = lpr
      printer-ip-address = 0.0.0.0
      print-queue-name = raw
;
/*
```

Figure 3-24   Sample job to create a protocol object

The printer object

You can specify all attributes in the printer object. However, in order for Infoprint Server to display the correct ISPF panels for a printer definition, you must specify the *printer-type* attribute. Also, you can include predefined objects. However, some objects are valid only for certain printer types, as defined by the printer-type attribute.

Figure 3-25 on page 53 shows a job that creates a complete printer definition. All four objects (alloc01, process01, opt01, prot01) are included into this printer; in this example we decided to override a few attributes.

> **Important:** Attributes in the printer object override any other attributes specified in an object.

```
//KGOE#05 JOB    (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUID
//CREATE  EXEC PGM=AOPBATCH,PARM='pidu'
//STDOUT   DD SYSOUT=*
//STDERR   DD SYSOUT=*
//* STDENV may point to your environment variables
//STDIN    DD *
create printer template
       include-allocation = alloc01
       include-processing = process01
       include-printway-options = opt01
       include-protocol = prot01
       dcf-routing = yes
       forms = LOCAL
       destination = PRT01
       printer-type = ip-printway
       printer-ip-address = 9.12.6.49
       print-queue-name = EMAIL01
;
/*
```

Figure 3-25   Sample job to create a printer definition

After a printer object has been defined, you can modify it in the ISPF panel. An asterisk (*) in the Custom values field means that one or more attributes in the object called component have been overwritten by attributes in the printer object. To add, delete, or modify attributes, you can use the ISPF panel interface or the pidu utility.

```
Edit                    IP PrintWay Printer Definition
Command ==> _____

Printer definition name . template_____
Description . _____ (extend)
Location. . . _____ (extend)

                       Component name        Custom values
Section                (enter to list)      (enter to customize)
Allocation          => alloc01_____       => *_
Processing          => process01_____      => __
NetSpool options    => _____      => __
NetSpool end-of-file => _____       => __
IP PrintWay options => opt01_____       => __
Protocol            => prot01_____       => *_

/ Use DEST, CLASS, and FORMS for IP PrintWay printer selection
NetSpool LU name . _____    LU classes . . __  __  __  __  __  __  (extend)
```

Figure 3-26   IP Printway printer definition panel

> **Tip:** To view the values that are active, place your cursor on the Custom values field and press Enter.

3.17 AOPPRINT procedure usage examples

Print Interface provides the AOPPRINT JCL procedure in SYS1.PROCLIB so that local users can submit the **lp** command from a batch job. You can use the printer template (created in Figure 3-25 on page 53 and displayed in Figure 3-26 on page 53) to print to any printer. However, keep in mind that attributes were set, and the printer must support all attributes set in the printer object (for example, printer-codepage=ISO8859-1).

However, you can override some of these attributes. In Figure 3-27, for example, we changed the real printer (that is, the IP address and queue name). The *title-text* attribute can be used, at the receiver side, to identify the printout. This procedure is useful when you transfer print jobs on another server where you cannot change the attributes easily.

```
//KGOE#06 JOB    (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUID
//PRINT   EXEC AOPPRINT,PRINTER='template',
//             OPTIONS='attributes=//DD:ATTR'
//SYSIN    DD *
Hello

here am I. This is your Infoprint Server who
has printed that for you.

§ 1 - When something is wrong write
      an e-mail to Infoprint@ibm.com

Regards, Infoprint Server
/*
//ATTR     DD *
printer-ip-address = 9.12.4.87
print-queue-name = raw
title-text = 'Test Print'
/*
```

Figure 3-27   Sample AOPPRINT

OUTCLASS=class

This specifies the 1-character alphanumeric name of the sysout class for informational messages. The name of the data set where informational messages are written is specified by the STDOUT DDname.

ERRCLASS=class

This specifies the 1-character alphanumeric name of the system output data set (sysout) class for error messages. The name of the data set where error messages are written is specified by the STDERR data definition name (DDname).

PRINTER=printer_definition_name

This specifies the name of a printer definition created by your administrator. The printer definition identifies a printer or an e-mail destination, and sets default values for transform options and for some job attributes. The name of the printer definition is case sensitive. Enter it exactly as your administrator indicates.

OPTIONS='attribute=value ...'

This specifies job attributes and values to use in processing the job. Enter the attribute names in lower case, and separate attributes by using a space.To specify more than 120 characters of job attributes, then specify a UNIX file or an MVS data set instead. Use the attribute called *attributes* to specify the file or DD name from which attributes are to be read.

3.17.1 Remote print server

Select the IP PrintWay LPR protocol if you want IP PrintWay to transmit data sets to the printer or print server using the TCP/IP LPR protocol defined by RFC 1179. When IP PrintWay uses this protocol, an LPD that adheres to RFC 1179 must be running in the remote printer or print server.

RFC 1179 describes a print server protocol that is widely used on the Internet for communicating between line printer daemons (both clients and servers). However, many printer (or print server box) manufacturers totally ignore the details of the RFC1179 protocol and simply accept the data files for printing, disregarding the control file until they need to print a banner or provide status information. For example, even if you specify copies, the LPD may ignore them.

```
//KGOE#07 JOB   (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUID
//PR     EXEC AOPPRINT,PRINTER='template',
//           OPTIONS='attributes=//DD:ATTR'
//SYSIN   DD *
Hello

here am I. This is your Infoprint Server who
has printed that for you.

§ 1 - When something is wrong write
      an e-mail to Infoprint@ibm.com

Regards, Infoprint Server
/*
//ATTR    DD *
printer-ip-address = 9.12.4.48
print-queue-name = AFP2PCL
copies = 2
title-text = 'Test Print'
/*
```

Figure 3-28   Sample AOPPRINT to print to a print server

You can use the **lpq** command to query the names, locations, and descriptions of printers, and to query the status of a print request; see Figure 3-29 on page 56. Many operating systems provide a **lpq** command but the response differs, depending on the LPD being asked.

```
C:\>lpq -S 9.12.4.88 -P raw -l
Active: wtsc74.itso.ibm.com printing via LPD

C:\>lpq -S 9.12.4.87 -P raw -l
No entries

C:\>lpq -S 9.12.4.70 -P PRT-A -l

Printer: PRT-A
 Job   Owner     Status      Format   Size     File
------ --------  ----------- ------   -------   -----------------
    17 AOPSTC    pending     line         704  PWAPPL01
    27 AOPSTC    pending     line         952  PWAPPL01

C:\>
```

Figure 3-29   Query replies

3.17.2 Remote PSF print server

IP PrintWay can transmit files to Infoprint Manager for AIX® or Infoprint Manager for Windows on the remote system. It creates **-o** parameters in the control file. The **-o** parameters contain AFP values specified by the job submitter, such as a page-definition attribute.

You can use the Infoprint Server subsystem to submit batch jobs to the local Infoprint Server, because the Print Interface aoplpd program accepts Infoprint Server job attributes; see Figure 3-30. This procedure might be useful when you want to distribute your AFP jobs to a different Infoprint Server that accepts AFP data.

```
//KGOE#01  JOB   (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUID
//CREATE   EXEC PGM=AOPBATCH,PARM='pidu'
//STDOUT    DD SYSOUT=*
//STDERR    DD SYSOUT=*
//* STDENV may point to your environment variables
//STDIN     DD *
create printer remote-PSF
      printer-type = ip-printway
      output-class = P
      destination = PSF
      document-formats-supported = {
          line
          modca
      }
      print-queue-name = PSF
      printer-ip-address = 9.12.4.70
      dcf-routing = yes
      location = "Poughkeepsie Building 008"
      lpr-mode = to-remote-psf
;
/*
```

Figure 3-30   Sample to create printer template

Figure 3-31 displays JCL to submit a job to the created printer.

```
//KGOE#02  JOB   (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUID
//PW      OUTPUT NOTIFY=&SYSUID,
//        FSSDATA=('printer=remote-PSF'),
//        PAGEDEF=C09182,
//        FORMDEF=A10110,
//        CHARS=GTE1,
//        PRTQUEUE=EMAIL01,
//        CLASS=P
//PRINT   EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSIN    DD DUMMY
//SYSUT2   DD SYSOUT=P,OUTPUT=(*.PW)
//SYSUT1   DD *
Hello

here am I.
This is your Infoprint Server
who has printed that for you.

§ 1 - When something is wrong write
      an e-mail to Infoprint@ibm.com

Regards, Infoprint Server
/*
```

Figure 3-31   JCL to submit a job to created printer

4

Migrating from basic mode to extended mode

Because IP PrintWay basic mode had outgrown its design point, a new and more flexible, scalable, usable, and reliable mode was developed. IP PrintWay extended mode provides additional functions that help you manage printers and print jobs more easily. IP PrintWay extended mode is a UNIX application that uses z/OS UNIX System Services. Each mode can be replaced by the other, however, IBM does not plan additional enhancements to IP PrintWay basic mode. That is, all future enhancements are done only to IP PrintWay extended mode.

This chapter provides an overview of Infoprint Server changes, and it provides information to assist Infoprint Server users in migrating from IP PrintWay basic mode to IP PrintWay extended mode. In summary:

► Customize IP Printway extended mode

► Review exits and printer definitions

► Review accounting by SMF type 6 records

► Set up common message log

► Configure Infoprint Central and HTTP Server

► Define job selection rules

► IP PrintWay extended mode interactions and dependencies

► Stop IP PrintWay basic mode and start IP Printway extended mode

59

4.1 IP PrintWay extended mode

IP PrintWay, starting with z/OS 1.5, uses the Sysout Application Programming Interface (SAPI) to obtain printouts from the JES spool, when it operates the new extended mode. IP PrintWay benefits from a better performance because the Sysout Application Programming Interface (SAPI) supports multiple, concurrent requests from the application.

IP PrintWay basic mode is the name used for the original IP PrintWay mode of operation, to distinguish the original mode from the IP PrintWay extended mode. You can continue to run IP PrintWay basic mode. However, no enhancements will be made to IP PrintWay basic mode. IBM will make enhancements in future releases only to IP PrintWay extended mode.

Operators can use Infoprint Central, instead of Infoprint Server ISPF panels, to access print jobs and printers from the network. All information and definitions about printer and print jobs selected by IP PrintWay extended mode are now kept in the printer inventory. JES definitions are no longer needed.

> **Note:** IP PrintWay extended mode cannot share printing information across systems in a sysplex.

4.2 Extended mode versus basic mode

Although IP PrintWay extended mode uses existing printer definitions, some printer attributes are no longer supported. Some attributes apply to either IP PrintWay basic mode or extended mode, but not both. Printer attributes that do not apply are ignored. For example, IP PrintWay extended mode does not use TCP/IP translate tables as IP PrintWay basic mode can. Table 4-1 lists the IP Printway modes.

Table 4-1   IP Printway modes

IP PrintWay extended mode	IP PrintWay basic mode
Uses Sysout Application Programming Interface	Uses Functional Subsystem Interface
Since z/OS 1.5	Original mode of operation
Runs as a daemon in UNIX System Service	Runs as started task in z/OS
Uses printer inventory and common message log	Uses VSAM queue file and message data set
Job selection defined in Infoprint Server	Work selection defined in JES
Managed using Infoprint Central or ISPF panels	Managed using ISPF panels only
Writes temporary files to UNIX file system	Writes temporary files to hiperspace
Filter programs (like Transforms) invoked directly	Uses resubmit for filtering
Limit of 4 GByte file size	Limit of 2 GByte file size
Support of IPv6 and IPv4	Support of IPv4
Can retain a unlimited number of print jobs	Limited by the region size below the line

4.2.1 Extended mode enhanced function and other advantages

IP PrintWay extended mode offers the following enhanced function, which gives you advantages over the use of basic mode:

► Can print data sets up to 4 GByte if space is available in the file system.

 – Temporary print files are stored in a subdirectory under /var/Printsrv/printway/.

 – Temporary print job status information is stored under /var/Printsrv.

► Writes a printer address for all protocol types in the SMF type 6 record.

► Can print on printers that have IPv6 addresses.

 – You must use the host name (instead of the colon-hexadecimal address) in the DEST=IP: JCL parameter.

► Can process more print jobs without running out of address space. Print jobs do not have to be kept allocated.

 – $F02 or S878 abend codes are less likely.

► Can retain an unlimited number of print jobs.

► Does not require that you customize JES.

► New management functions for operators using Infoprint Central

 – Find and display printers or print jobs.

 – Redirect print job to another IP PrintWay printer.

 – Start and stop printers.

 – View the message log.

 – View properties.

► Automatically detect data format and verify that a job will print on a selected printer.

► Sends additional Infoprint Server messages to the z/OS system hardcopy log.

► IP PrintWay extended mode allows you to track the number of pages printed on printers that support HP PJL protocol.

4.3 Tasks required to migrate

The following customization is required to migrate to extended mode:

► Modifications to the aopd.conf configuration file
► Customize the aopmsg.conf configuration file
► Printer Inventory directories and files
► Consider the space requirements for temporary files
► Environment variables for IP PrintWay extended mode
► IP PrintWay job selection rules
► Infoprint central customization

4.3.1 Edit the Infoprint Server configuration file aopd.conf

You must add or edit the Infoprint Server configuration file, aopd.conf.

The following attributes in aopd.conf apply to IP PrintWay extended mode.

start-daemon = { outd }

Add the outd value to any existing value in this attribute to start the IP PrintWay extended mode daemons (aopoutd and aopwsmd). By default, the Printer Inventory Manager daemons and the LPD start. The AOPOUTD address space is shown in Figure 4-1 on page 63.

The AOPWSMD address space is the work selection client that manages and starts the work selection elements for getting jobs from the JES spool through the SAPI interface. The address space uses the IP PrintWay job selection rules in the Printer Inventory to select output data sets from the JES spool.

smf-recording = yes | no

This attribute indicates whether IP PrintWay extended mode writes SMF type 6 records for data sets that it sends to a printer or e-mail destination.The default is yes.

resolve-printway-printers = yes | no

This attribute indicates whether IP PrintWay extended mode looks up the full hostnames of printers in the Domain Name Server (DNS). Because different threads can be printing at the same time, there is an increased possibility of connection refused errors if two or more printer definitions are being used at the same time. Resolving all printer IP addresses both ways, by IP and by name, allows PrintWay to serialize the jobs going to the same target device. The default is yes.

log-retention = days

This refers to the number of days of messages to keep in the common message log and information about output data sets that are no longer on the JES spool to keep in the Historical Inventory. A value of zero (0) means that nothing is kept. The default is 1 day.

max-historical-inventory-size = megabytes

The maximum size (in megabyte) of the Historical Inventory. The default is 10 MByte.

Note: If you change one of these attributes while Infoprint Server is running, then stop and restart the IP PrintWay extended mode daemons.
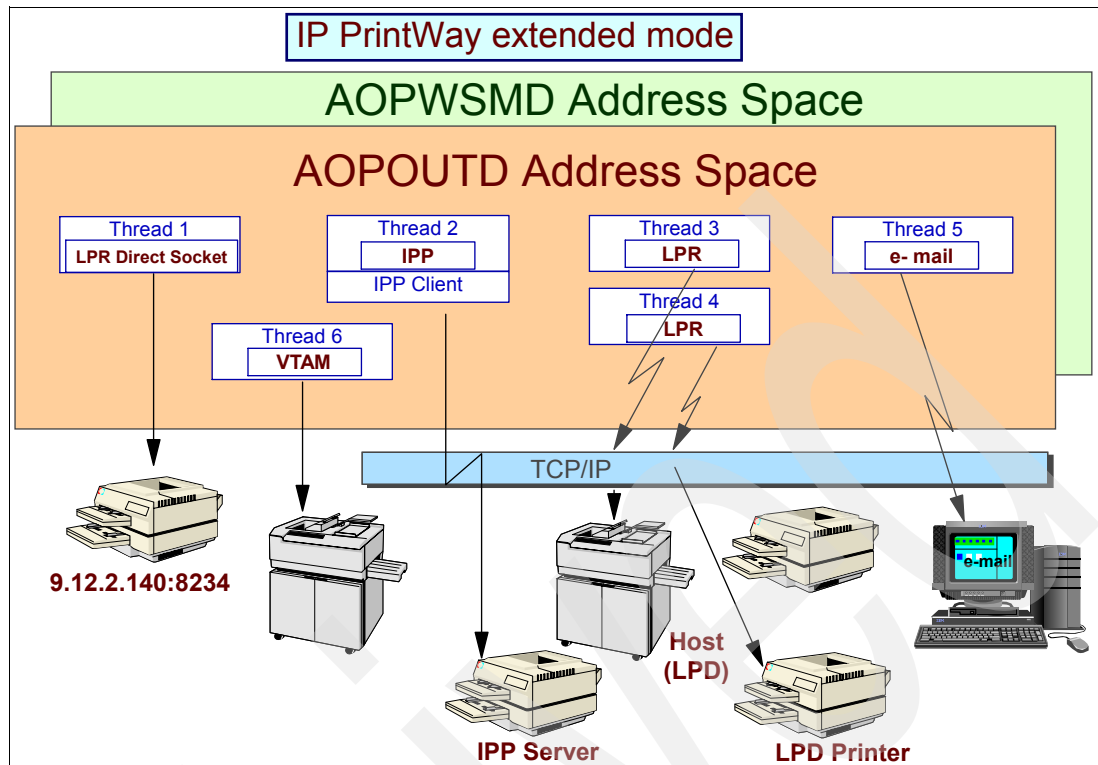
Figure 4-1   AOPOUTD address space used by IP PrintWay extended mode

4.3.2 Infoprint Server message configuration file aopmsg.conf

The Infoprint Server message configuration file, aopmsg.conf, lets you customize message processing. This configuration file is optional. If the file does not exist, or if an attribute in the file is omitted, Infoprint Server uses default values. If you did not create the configuration file in the default location, you need to set the AOPMSG_CONF environment variable.

> **AOPMSG_CONF** - The full path name of the Infoprint Server message configuration file.

In the aopmsg.conf configuration file, you specify the following attributes that customize Infoprint Server message processing.

hardcopy-messages = all | list | none

This specifies which additional messages Infoprint Server sends to the hardcopy log. If you specify `hardcopy-messages=list`, also specify `hardcopy-messages-list`.

all   This sends all eligible messages to the hardcopy log.

list   This sends only the additional messages that are listed in the hardcopy-message-list attribute to the hardcopy log.

none   This sends no additional messages to the hardcopy log. Only console messages are sent to the hardcopy log. This is the default.

> **Attention:** If you change this attribute while any Infoprint Server daemons are running, restart all daemons.

hardcopy-message-list = {messageID messageID ...}

These are the message IDs of the messages that Infoprint Server sends to the hardcopy log when the `hardcopy-messages=list` attribute is specified. Specify the entire message ID, including the severity code (E, I, S, T, or W). You can use either upper case or lower case characters. Enclose the list of messages in braces, and separate message IDs with spaces.

```
Example: hardcopy-message-list={AOP3614I AOP3803E}
```

4.4 Printer Inventory directories and files

The Printer Inventory Manager uses two hierarchical file system directories:

► The /etc/Printsrv directory, which is the default location for Infoprint Server configuration files

The /etc/Printsrv directory contains all Infoprint Server configuration files. This directory is created automatically with the appropriate permissions when you install Infoprint Server.

► The /var/Printsrv directory

Figure 4-2 Mountpoint for the printer inventory

Sysplex environment

If your system is part of a sysplex, the /var/Printsrv file system must be system-specific and designated NOAUTOMOVE in the BPXPRMxx PARMLIB member. If you specify a different base directory in the base directory attribute in the Infoprint Server configuration file, the file system that contains this directory must be system-specific and designated NOAUTOMOVE.

Recommendation: Do not change the owner or permissions of the /etc/Printsrv directory. For a secure environment, this directory should be:

► Owned by the UID of 0.
► Writable only by users with an effective UID of 0.

You can create Infoprint Server configuration files in a directory other than the /etc/Printsrv directory. If you do so, specify the location of the configuration files in Infoprint Server environment variables.

4.4.1 /var/Printsrv directory

The /var/Printsrv directory specified by the *base-directory* attribute in the Infoprint Server configuration file (aopd.conf) is the default location for other Infoprint Server files, including the Printer Inventory files.

Printer Inventory Manager creates the Printer Inventory files automatically the first time Infoprint Server is started. The Printer Inventory files contain objects that the administrator created, as shown in Figure 4-3 on page 66. However, there are also objects that the administrator does not create. For example, Print Interface creates objects for each job processed. These job objects are deleted when the data sets to which they correspond are deleted from the JES spool.

/var/Printsrv files

The directory specified by the *base-directory* attribute in the Infoprint Server configuration file (aopd.conf) and its subdirectories contain these types of files that are shown in Figure 4-3 on page 66.

The /var/Printsrv directory also contains temporary files that the Print Interface LPD creates as it receives data from clients that send the control file after sending data files. As previously mentioned, by default, most clients send the control file after sending data files. The Infoprint Port Monitor always sends the control file first. Commands such as **ls** do not display these files because the LPD unlinks them after it opens them. When the LPD closes the files, they are deleted.
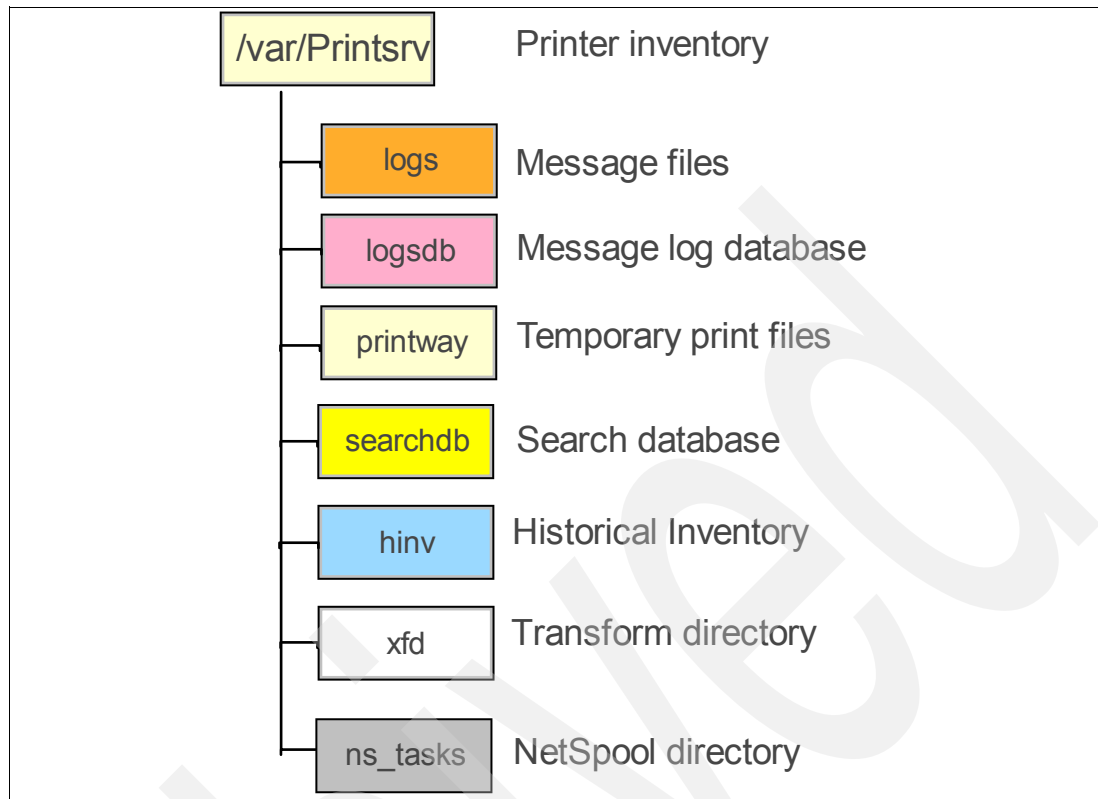
Figure 4-3   /var/Printsrv directory structure

4.4.2 Calculate the space needed for temporary files

The amount of space required depends on a variety of factors, such as the number of printers you have, the size of data sets you process, and the number of days of messages and historical information you want to keep.

/var/Printsrv space requirements

In some cases, IP PrintWay has to read the entire file before it can begin processing. These temporary files are stored in a subdirectory specified by the *base-directory* attribute. The default is /var/Printsrv/, and temporary print files are stored under /var/Printsrv/printway/. This significantly increases the space requirement for the /var/ directory.

> **Recommendation:** Mount a separate file system at this mount point.

Temporary file creation

Files are created in the following situations:

► Temporary files that the Print Interface LPD creates as it receives data from LPR clients that send the control file after sending data files. By default, most clients send the control file after sending data files. The Infoprint Port Monitor, however, always sends the control file first. Commands such as `ls` do not display these files because the LPD unlinks them after it opens them. When the LPD closes the files, they are deleted.

► Language Environment® dumps (CEEDUMPs)

► /var/Printsrv/printway - this directory contains temporary files that IP PrintWay extended mode writes before transmitting data to printers. IP PrintWay extended mode always

writes temporary files when it uses the LPR transmission protocol. It also writes temporary files when it uses the IPP or direct-socket transmission, but only if more than one copy is requested.

Note that IP PrintWay basic mode never writes temporary files in this directory. Instead, IP PrintWay basic mode writes temporary files in hiperspace.

► IPP or direct-sockets protocol and printer definition specifies either:

– Copies

– Maximum document size

The amount of space needed for temporary print files depends on:

► Maximum size of a document

► Maximum number of documents in a job

► Number of concurrently active printers

For example:
```
max. document size (4GB) * 2 documents per jobs * 5 active printers = 40 GB
```

It is unlikely that 5 printers would print such large documents all at the same time—but you should at least consider the possibility of that occurrence.

> **Recommendation:** Restrict very large jobs to one or two target printers.

4.4.3 Space allocation for /var/Printsrv file system

The amount of space required for the file system at the /var/Printsrv mount point depends on a variety of factors such as the number of printers you have, the size of data sets you process, and the number of days of messages and historical information you want to keep. Use the information in this section to estimate how much space you need to allocate for the file system. Also, other factors can influence how much space is required.

> **Guideline:** Allocate at least 750 MB of DASD space for the file system mounted at the /var/Printsrv mount point. If you do not run IP PrintWay extended mode or use data stream transforms, you might need less space. If you print extremely large files, or if you want to keep many days of messages and historical information, you might need more space.

The default maximum size of the Historical Inventory is 10 MByte. To change the maximum size, specify the following items:

► The max-historical-inventory-size attribute in the Infoprint Server configuration file, (aopd.conf). For the search (searchdb) database, allow five times more space than the maximum for the Historical Inventory.

► Also, allow an additional 12 K for each printer that IP PrintWay or PSF controls. The number of days specified in the log-retention attribute in the Infoprint Server configuration file (aopd.conf) determines the size of the message log database.

► For every 1000 data sets processed, allow 2 MB in the logs directory and 6 MB in the logdb directory.

Tip: The Printer Inventory, Historical Inventory, search database, and message log database are optimized for rapid direct access to objects. As you add objects to the databases, files in the databases increase in size. When you remove objects, the files do not decrease in size because the Printer Inventory Manager designates as available the space that had been occupied by the removed objects. When you add objects in the future, the Printer Inventory Manager uses available space in the files. The files increase in size only when they do not contain sufficient available storage. So, the size of files can be characterized as a high-water mark.

Allocate a file system for /var/Printsrv directory

Allocate a 1 GByte zFS data set for a file system to be mounted at the /var/Printsrv mount point (unless you decide that one of the space requirements as described applies to your environment, so that you need a larger size or smaller size).

For an existing Infoprint Server system that is currently defined, follow these steps.

1. Copy the existing /var/Printsrv directory structure from a shell session using the `tar` command to copy the files into an archive file in /tmp:

   ```
   cd /var/Printsrv
   tar -cvf /tmp/printsrv.tar *
   ```

2. Create a file system to mount at /var/Printsrv, as shown in Figure 4-4. For example, a 1GByte zFS aggregate contains about 1500 cylinders:

   ```
   zfsadm create -a OMVS.VAR.PRINTSRV -cylinders 1500 0 -volumes xxxxxx
   zfsadm format -a OMVS.VAR.PRINSRV -compat
   ```

   Note: One cylinder in a zFS aggregate contains 90 8K blocks.

3. Delete all the files that are currently in /var/Printsrv.

4. Mount the new file system just created at /var/Printsrv, as shown in Figure 4-4.

5. Copy the previous offloaded files to the newly created file system:

   ```
   cd /var/Printsrv
   tar -xvf /tmp/printsrv.tar
   ```


Figure 4-4   Infoprint Server file system structure with a /var/Printsrv file system mounted
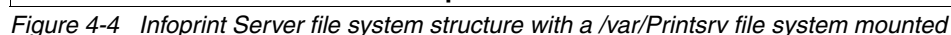
Check the status of /var/Printsrv

To learn how to check the status of /var/Printsrv directory space usage, refer to Appendix C.1, "Infoprint Server health check" on page 174, where you will find a sample health check routine that you can use to monitor this situation.

4.4.4 Specify environment variables for IP PrintWay extended mode

You must specify environment variables for IP PrintWay extended mode if any of these conditions apply:

► You have written IP PrintWay exits and the library that contains the exits is not in the system LNKLST

► You use FCBs in your installation and the SYS1.IMAGELIB library is not in the system LNKLST

► You send output to e-mail destinations and the z/OS UNIX `sendmail` command was not installed in the default directory

► You want to customize the IP PrintWay e-mail function

► You have more than one TCP/IP stack in your installation

► You print on a VTAM-controlled printer

► You installed Infoprint Server libraries in a different location

► You want to suppress errors due to missing printer definitions

► You print line data that contains unprintable characters

Note: For security reasons, Infoprint Server daemons use some variables only if they are set in the aopstart EXEC. Infoprint Server does not use variables set in /etc/profile.

4.4.5 Define IP PrintWay job-selection rules

You do not need to add JES functional subsystems for IP PrintWay extended mode. Also, there are no JES definitions needed. All you need is a job selection rule, because job selection rules are comparable to the JES work selection criteria you specified in IP PrintWay basic mode.

IP PrintWay extended mode uses the job selection rules defined in the Printer Inventory to determine which print jobs to select from the JES spool for printing. You must create at least one job selection rule in order for IP PrintWay to select print jobs. The attributes of the print job must match all of the values in a rule to be selected.

All job selection rules are managed by the AOPWSMD address space. Each rule is a thread managed by the work selection manager, and can be enabled or disabled. AOPWSMD_MAXTHREADTASKS limits the number of active job-selection rules.

```
pidu -c 'create job-selection-rule NewRule
              job-selection-status = enabled | disabled
              output-class-list = null | {N P}
              creator-userid = null| "KGOE"
              dest-ip-address = include | exclude | ignore
              destination-pattern = null | "PRT*"
              forms-list = null | {"STD" "F*PRT}
              jes-writer-pattern = null | "EXTWTR"
              operator-security-profile = null | "ITSO.TESTPRT"
              description = "Select print jobs in Class N and P" ; '
```
Figure 4-5   The pidu command to define job selection rule

You define job selection rules in the printer inventory. You do not need to define all attributes of a selection rule. However, if you want to run IP PrintWay extended mode and IP PrintWay basic mode at the same time, make sure that IP PrintWay extended mode does not select the same print jobs as IP PrintWay basic mode does.

4.4.6 Customize Infoprint Central

Because all information about Infoprint Server is maintained in a UNIX file system, there is a great dependency on Infoprint Central to manage IP PrintWay extended mode. Use Infoprint Central for easier access to databases maintained by Infoprint Server. Also, operators can use Infoprint Central instead of Infoprint Server ISPF panels to work with printers and print jobs.

You *must* use Infoprint Central to perform these tasks:

► Redirect print jobs on a printer's queue
► Start and stop IP PrintWay printers
► Start and stop job selection rules
► Display messages related to a particular printer or print job
► Delete or hold print jobs that IP PrintWay extended mode is currently processing

4.5 Migration issues and concerns

Both IP PrintWay extended mode and IP PrintWay basic mode can be used with current versions of Infoprint Server.

If you plan to run IP PrintWay extended mode on more than one system in a sysplex, you must set different work selection criteria. IP PrintWay extended mode cannot share printing information across multiple systems in a sysplex as IP PrintWay basic mode can.

IP PrintWay extended mode always uses the z/OS iconv utility to convert between EBCDIC and ASCII code pages. It does not use standard or customized TCP/IP translate tables as IP PrintWay basic mode can.

IP PrintWay extended mode does not call the message exit and the response notification exit. Also, IP PrintWay extended mode does not pass some fields in the ANFUEXTP control block to IP PrintWay exits, and it ignores requests from the exits to hold or delete data sets.

IP PrintWay extended mode writes different fields in the SMF type 6 record than IP PrintWay basic mode.

Though IP PrintWay extended mode can use printer definitions which are also used by IP PrintWay basic mode, some attributes apply to either IP PrintWay basic mode or extended mode, but not both. Printer attributes that do not apply are ignored. If you use one of those attributes then the result may differ, depending on the mode of IP PrintWay.

4.5.1 Attributes to review

This section describes the changes you might need to make in printer definitions that specify these fields when you migrate to extended mode.

document-formats-supported

Select the data formats that IP PrintWay should accept. This field also applies to IP PrintWay basic mode, but only when the `resubmit-for-filtering` option is selected.

duplexes-supported

Select the duplex option that IP PrintWay should allow. This field also applies to IP PrintWay basic mode, but only when the `resubmit-for-filtering` option is selected.

printway-formatting

IP PrintWay extended mode ignores this formatting option.

db-translate-table, translation-dataset-qualifier, printway-sosi-mode

IP PrintWay extended mode does not use single-byte or double-byte TCP/IP translate tables specified in these fields to translate data. PrintWay extended mode uses only the iconv utility to translate data between code pages.

line-termination

IP PrintWay extended mode ignores this field for the LPR, direct-sockets, IPP, or e-mail protocol. However, IP PrintWay extended mode lets you specify the line termination controls for the VTAM protocol.

printway-postscript

IP PrintWay extended mode ignores this field and does not add any Postscript headers.

resubmit-for-filtering

IP PrintWay extended mode ignores this field because it transforms data streams by calling the transforms directly, without resubmitting the data sets to Print Interface.

automatic-dataset-grouping

This field does not apply to IP PrintWay basic mode, and if selected, overrides the option selected in the data set grouping field. Select this field for more efficient printing if your printer supports it.

operator-security-profile

This field does not apply to IP PrintWay basic mode. It specifies the name of the RACF profile for the printer if you use Infoprint Central.

page-accounting

This attribute is new for Infoprint Server in z/OS V1R8, and does not apply to IP PrintWay basic mode. Select this field for more accurate accounting information. If selected, IP

PrintWay extended mode records the number of printed pages in the SMF type 6 record. The printer must support PJL and the direct sockets printing protocol.

page-restart

This attribute is new in Infoprint Server z/OS V1R8, and does not apply to IP PrintWay basic mode. If this field is selected, IP PrintWay extended mode tells the printer to restart printing after the last page that the printer reported printed successfully. The printer must support PJL and the direct sockets printing protocol.

4.6 The SMF type 6 record

If you want IP PrintWay extended mode to write System Management Facilities (SMF) type 6 records, you must authorize the user ID that starts Infoprint Server daemons to write SMF records. To do this, give the user ID that starts Infoprint Server daemons READ access to the BPX.SMF profile in the FACILITY class. This user ID should be a member of the AOPOPER group.

If Infoprint Server is not permitted to BPX.SMF, you might see a repetitive message stating `AOP3608E IP PrintWay could not write an SMF record`. If you do not want IP PrintWay extended mode to write SMF type 6 records, specify the attribute smf-recording = no in the Infoprint Server configuration file.

To authorize IP PrintWay to write SMF type 6 records, follow these steps:

1. Define the BPX.SMF profile in the FACILITY class.

   ```
   RDEFINE FACILITY (BPX.SMF) UACC(NONE)
   ```

2. Give the AOPOPER group READ access to the BPX.SMF profile.

   ```
   PERMIT BPX.SMF CLASS(FACILITY) ID(AOPOPER) ACCESS(READ)
   SETROPTS RACLIST(FACILITY) REFRESH
   ```

If you permit READ access to BPX.SMF while Infoprint Server is running, stop and restart the IP PrintWay extended mode daemons.

IP PrintWay extended mode writes information in new fields in the SMF type 6 record. Therefore, you must recompile your SMF exit when you migrate to IP PrintWay extended mode. A new mapping macro, AOPSMF6, has been created; it maps segments written by IP PrintWay and PSF. This new macro is invoked by IFASMFR internally. Differences in content occur in the File Transfer section.

SMF6INDC

This field indicates IP Printway extended mode when set to 7. It indicates IP Printway basic mode when set to 1.

SMF6BYTD

This indicates total bytes transmitted to printer that supports files greater than 2 GByte.

SMF6FTL

This is the level indicator for the file transfer section. 1 = IP Printway extended mode.

SMF6URI

This indicates what protocol was used.

SMF6URIL

This indicates the length of the SNF6URI field.

SMF6IP1, SMF6IP2, SMF6IP3, and SMF6IP4

This contains binary zeros for IP Printway extended mode.

SMF6OUT

This field contains the name of the IP PrintWay basic mode FSA. If you run IP PrintWay extended mode, which does not have an FSA, this field contains zeroes.

> **Note:** For information about the SMF type 6 record that IP PrintWay extended mode writes, see *z/OS MVS System Management Facilities (SMF)*, SA22-7630.

4.7 User exits

All exits run in problem state with a protection key of 8 if invoked by IP Printway extended mode. You do not need to change your exits. They can be used by IP PrintWay extended mode, as well as by IP Printway basic mode.

Also, exits do not have to be recompiled, except the ANFUXSMF exit. However, when you install a new release, exit parameter areas or other macros may have changed; therefore, it is always recommended that you recompile all exits with the newest set of macros.

In IP PrintWay extended mode, the routing exit cannot share XTPWORK1 and XTPWORK2 values with other exits.

4.7.1 Exits used by IP PrintWay

The following exits are used by IP PrintWay.

Begin Data set exit

No changes. The administrator specifies the name of the Begin Data Set exit in the printer definition. Therefore, you can write different Begin Data Set exits for different printers; for example, the exit can add records to create a separator page.

Record exit

No changes. The administrator specifies the name of the Record exit in the printer definition. Therefore, you can write different Record exits for different printers; for example, add one or more records, replace a record, or delete a record.

End Data Set exit

No changes. The administrator specifies the name of the End Data Set exit in the printer definition. Therefore, you can write different End Data Set exits for different printers; for example, the exit can add records to create a trailer page.

SMF exit ANFUXSMF

IP PrintWay calls the same SMF exit for all data sets, and you must recompile your exit. If you do not write an SMF exit, IP PrintWay writes a standard SMF type 6 record for each data set sent to the printer. IP PrintWay extended mode writes different fields in the SMF type 6 record than IP PrintWay basic mode.

Flag XTPDSJNW indicates whether this is a JESNEWS data set. This flag applies only to IP PrintWay basic mode.

Message exit ANFUXMSG
The message exit applies only to IP PrintWay basic mode.

Response Notification exit ANFUXRSP
The Response Notification exit applies only to IP PrintWay basic mode.

Routing exit ANFUSRTG
This Routing exit lets you reroute a data set (IP PrintWay basic mode) or output group (IP PrintWay extended mode) to another printer or e-mail destination. IP PrintWay calls the same Routing exit for all data sets.

4.7.2 The exit parameter area - ANFUEXTP

When you run IP PrintWay extended mode, the same ANFUEXTP control block is shared by all exits except for the Routing exit. IP PrintWay extended mode does not pass some fields in the ANFUEXTP control block to IP PrintWay exits, and it ignores requests from the exits to hold or delete data sets.

4.7.3 The job separator page data area - IAZJSPA

IP PrintWay extended mode uses the Subsystem Application Programming Interface (SAPI) to obtain a SYSOUT data set from JES. SAPI does not provide a way for IP PrintWay extended mode to obtain the job separator page data area (JSPA) control block for the SYSOUT data set. Therefore, IP PrintWay extended mode constructs a partial JSPA from the information provided by SAPI and includes a pointer to this formulated JSPA control block in the ANFUEXTP control block that it passes to user exits.

IP PrintWay extended mode cannot obtain or construct a JMR control block. Therefore, it sets the JSPAJMR field to 0. The partial JSPA that IP PrintWay extended mode creates contains information that is available to it, as listed in Table 4-2.

Table 4-2   Job separator page area fields

Fields which contain valid values	Fields which do not contain valid values
JSPAJBNM	JSPADEVN
JSPAJBID	JSPADEVA
JSPJGRPN	JSPAJMR
JSPJGRPD	JSPJGRP1
JSPJRMNO	JSPJGRP2
JSPJPNAM	JSPAUSR1
JSPJDSNM	JSPAUSR2
JSPJSOCL	JSPCELEN
JSPJPRIO	JSPCEVSN
JSPCEUID	JSPCESEC

Fields which contain valid values	Fields which do not contain valid values
JSPCEDSN	
JSPCESEG	

4.8 IP Printway and VTAM-controlled printers

IP PrintWay requires Infoprint coaxial printer support for z/OS, 5655-N62 to print on VTAM-controlled printers in an SNA network. This additional feature of Infoprint Server lets you transform line data to Data Stream Compatibility/Data Stream Extended (DSC/DSE) or SNA character string (SCS); see Figure 4-6.

```
PRINTWAY VBUILD TYPE=APPL APPLICATION MAJOR NODE
*
PWAPPL01 APPL   AUTH=ACQ   APPL for an IP PrintWay basic mode FSS
PWAPPL02 APPL   AUTH=ACQ   APPL for IP PrintWay extended mode (aopoutd)
```

Figure 4-6   Sample APPL statements

When IP PrintWay prints on VTAM-controlled printers, it runs as a VTAM application program. Therefore, to print on VTAM-controlled printers, you must create a VTAM APPL statement in the SYS1.VTAMLST data set. Figure 4-7 on page 75 shows VTAM printer definition.

If IP PrintWay runs on more than one system in a sysplex, create unique APPL IDs for each system in the sysplex. If you run IP PrintWay basic mode, create an APPL statement with a unique APPL ID for each IP PrintWay FSS defined to JES.

> **Note:** When you run IP PrintWay basic mode and IP PrintWay extended mode at the same time, you cannot use the same APPL statement.

If you run IP PrintWay extended mode, you must specify the APPL ID in the AOP_APPLID environment variable in the **aopstart** EXEC. This REXX exec is used to establish a secure environment on which to start the Infoprint Server daemons. You must edit the **aopstart** EXEC.

```
create printer vtam-printer
       description = "prints to a VTAM-controlled printer"
       location = "Somewhere in the SNA network"
       printer-type = ip-printway
       protocol-type = vtam
       printer-luname = SC74PR01
       printer-codepage = IBM-037
       dcf-routing = yes
       forms = STD
       destination = VTAM
       output-class = P
;
```

Figure 4-7   VTAM printer definition

5

Infoprint Central

This chapter describes how to customize Infoprint Central. Infoprint Central is a component of Infoprint Server. It is a Web-based print management user interface that allows help desk operators, print administrators and users to view print jobs, queues and printers. Depending upon their security authorization, they can:

- ► Hold, move, cancel and release jobs
- ► Turn printers online and offline
- ► Pinpoint network connectivity problems
- ► Track Infoprint Central actions by user ID
- ► Perform many other functions for job and printer management

There is a great dependency on Infoprint Central to manage IP PrintWay extended mode, so you should customize Infoprint Central if you run IP PrintWay extended mode.

Infoprint Central helps you respond faster to questions about where print jobs have printed and why printers are not working. Using Infoprint Central, you can determine the status of print jobs, cancel print jobs, and move print jobs. It also allows you to determine the status of printers, to restart printers, and to redirect printers to alternate printers.

The printer operator can start and stop printers, change the forms loaded in printers, and redirect all print jobs to a different printer. Infoprint Central lets you determine where and when your print job printed, to see if a printer is busy, and to find the name of a printer in your building.

77

5.1 Infoprint Central and the HTTP server

As mentioned, Infoprint Central is Infoprint Server's Web-based tool for managing jobs and printers throughout the enterprise from anywhere with access to the Internet and a Web browser. Intended primarily for help desk operators, it lets users query the status of jobs and printers, see job or printer messages, stop and start printers, move jobs from one printer queue to another, cancel or hold jobs, and many other functions. Infoprint Central uses integrated z/OS security services so that users can be authorized to perform only certain tasks, or to perform tasks only on designated devices. Figure 5-1 illustrates Infoprint Central access to Infoprint Server.

Infoprint Central customization

This chapter explains how to customize Infoprint Central, and it provides you with a guideline for performing the tasks required. Apart from a Web browser, no other applications are needed on remote workstations, so all you need to do is start an HTTP server. The HTTP server must run on the same system as Infoprint Server.
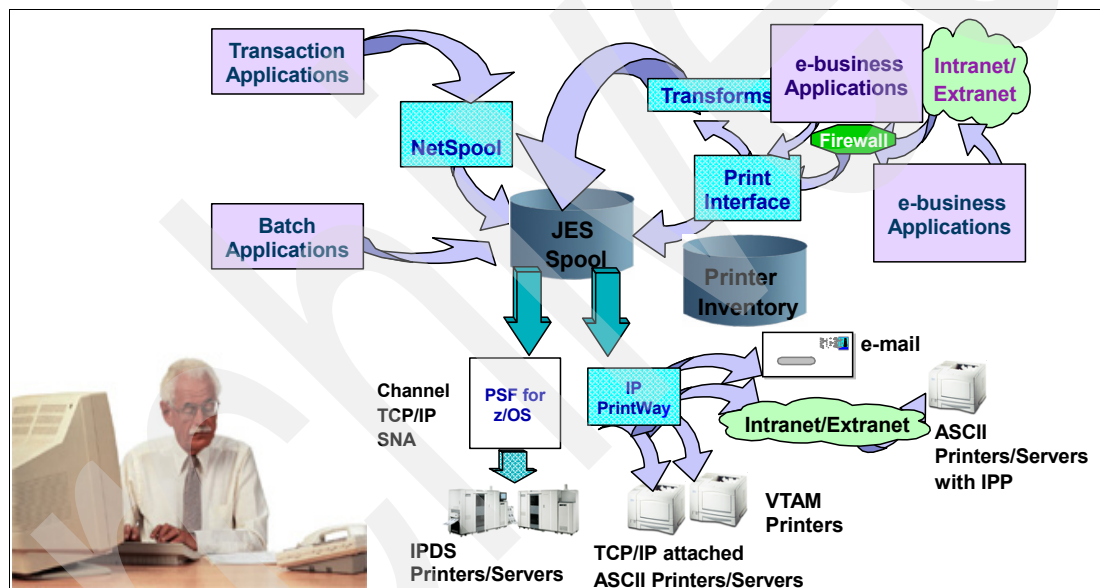
Figure 5-1   Infoprint Central access to Infoprint Server

5.1.1 Software requirements

The operating system must be at z/OS Version 1 Release 5 or higher. Additional IBM software beyond the z/OS base elements is required, as described here.

► Depending on the maintenance level of Infoprint Server, you need a different level of IBM XML Toolkit for z/OS, C++ edition. For example, after you apply the fix for APAR OA17015, Infoprint Central will no longer function with the XML Toolkit V1.6 level that Infoprint Central previously required.

  – XML Toolkit V1.8 is contained in either the IBM XML Toolkit for z/OS V1.8 package or in the IBM XML Toolkit for z/OS V1.9 package.

  – Each release of the XML Toolkit package includes the two prior versions. So XML Toolkit 1.8 includes 1.7 and 1.6.

► You also need SDK for z/OS, the Java™ 2 Technology Edition pointed to by the JAVA_HOME environment variable. Infoprint Central can use either Java 1.4 or Java 5.0.

► Any of these Web browsers can be used:
   – Microsoft® Internet Explorer® 5.5 (or a higher level)
   – Netscape Navigator 7.0 (or a higher level)
   – IBM Home Page Reader 4.0 (or a higher level)
   – Mozilla Firefox 2.0 (or a higher level)

> **Note:** When you apply maintenance to Infoprint Server, also restart the HTTP server hosting Infoprint Central to apply the changes here, as well.

5.1.2 The z/OS HTTP Server

You must start the z/OS HTTP Server to display Infoprint Server Web pages. The HTTP Server must run on the same system as Infoprint Server. This could mean that you have to start an HTTP Server on each z/OS system where Infoprint Server is running.You can start multiple instances of the HTTP server, but each instance must listen on a separate port or IP address.
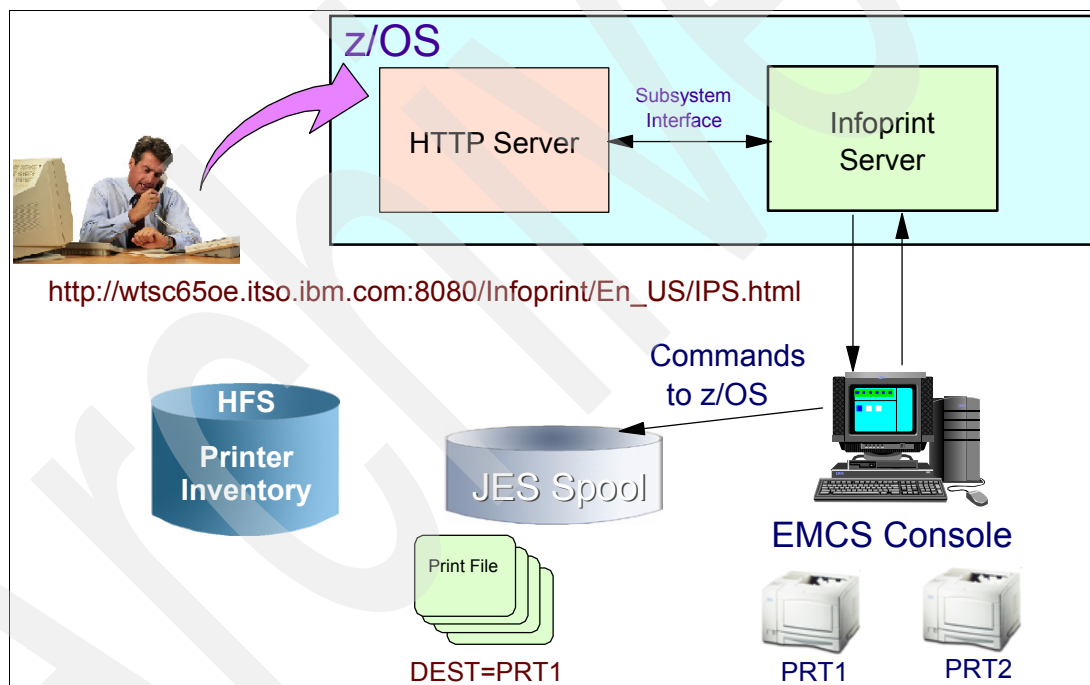
Figure 5-2   Infoprint Central and Infoprint Server

5.2 Customizing the z/OS HTTP Server

You must customize and start the z/OS HTTP Server to display Infoprint Central Web pages. The following customization options are available.

► Start a separate HTTP Server to be used exclusively by Infoprint Central. As mentioned, this can improve Infoprint Central performance. Also, this lets you customize the HTTP Server for Infoprint Central without affecting other applications that use the HTTP Server.

- Start an HTTP Server on each z/OS system where Infoprint Server is running. This is because the HTTP Server can display Infoprint Central Web pages only for the Infoprint Server running on the same z/OS system as the HTTP Server.
- Customize the HTTP Server to use the Secure Sockets Layer (SSL) protocol if you want to encrypt information that passes between the user's browser and the HTTP Server.

> **Important:** Refer to *z/OS HTTP Server Planning, Installing, and Using*, SC34-4826, for more information about customizing an HTTP Server for use with Infoprint Central.

5.2.1 HTTP procedure

Copy the IMWEBSRV sample member provided in SYS1.SAMPLIB to a site procedure library, for example, SYS1.PROCLIB(IMWPROC). Then make changes as needed to the member IMWPROC, which is shown in the example and in Figure 5-3 on page 82.

Assign user ID
The server needs to be assigned a user ID that you select. You can define your Web server to execute with a zero (0) or non-zero z/OS UNIX user ID.

```
RDEFINE STARTED IMWPROC.** STDATA(USER(AOPSTC))
SETROPTS RACLIST(STARTED) REFRESH
```

> **Note:** If you are changing the IMWPROC.** profile as an update, use RALTER statements instead of RDEFINE statements.

Authorize user ID
The Web server uses the following z/OS UNIX resource profiles to provide the user ID you select with the proper authority.

BPX.DAEMON The Web server normally uses this facility for daemon programs that need to validate user passwords and then change the MVS identity and z/OS UNIX UID and GID of a spawned address space.

BPX.SERVER The Web server normally uses this facility for its programs that use POSIX threads and that need to associate a surrogate MVS identity with each thread in their address space.

BPX.SMF The Web server normally uses this facility to validate read access to the user ID for writing SMF records.

RACF commands for authorization
You can issue the following commands to authorize the user ID:

```
PERMIT BPX.DAEMON CLASS(FACILITY) ID(AOPSTC) ACCESS(READ)
PERMIT BPX.SMF    CLASS(FACILITY) ID(AOPSTC) ACCESS(READ)
PERMIT BPX.SERVER CLASS(FACILITY) ID(AOPSTC) ACCESS(UPDATE)
SETROPTS RACLIST(FACILITY) REFRESH
```

Configure installed files by running setup.sh
Run the supplied z/OS UNIX System Services shell script (setup.sh) to change the ownership of the installed files to your Web administration user ID, set up permissions, create default configuration files, and configure languages. Or you can copy from:

```
/usr/lpp/internet/samples/config/C
```

Copy the configuration file to customize it. In the example startup procedure shown in Figure 5-3 on page 82, it was copied to /etc/Printsrv/httpd.conf.

> **Note:** To run setup.sh, you must be a superuser or the SMP/E installer. This means you must have read and execute permission for setup.sh. The permission file for setup.sh should be 700. If someone other than the owner or superuser runs setup.sh, it may not execute correctly.
>
> To execute setup.sh, you must be in the z/OS UNIX shell and utilities (by typing in `OMVS` at TSO ready). You cannot execute setup.sh in ISHELL. If you do not use the default Web administration user ID and group (WEBADM and IMWEB), then you must change these defaults coded in setup.sh to the specific names you used.

TCP/IP profile data set

In your TCP/IP profile, reserve the port that the server uses to access z/OS UNIX. The port directive in the HTTP configuration file specifies the port number being used. The default is TCP 80 for a base server, and TCP 443 for a secure server.

IMWPROC JCL

Changes to the sample IMWPROC JCL, shown in Figure 5-3 on page 82, are as follows:

ENVAR	The ENVAR option sets initial values for specified environment variables that the server is started with. Using ENVAR, you can pass switches or tagged information using standard z/OS UNIX functions.
	You may set additional environment variables using the _CEE_ENVFILE ENVAR option. The default _CEE_ENVFILE shipped with the server is /etc/httpd.envvars, which is compiled into the IMWHTTPD program. You can use the _CEE_ENVFILE ENVAR option to override this default.
	The environment variables are shipped with the server under /usr/lpp/internet/server_root/samples/config.
/etc/Printsrv/httpd.envvars	_CEE_ENVFILE=/etc/Printsrv/httpd.envvars is used in Figure 5-3 on page 82 for Infoprint Central HTTP server.
-r configuration-file	This specifies the file to use as the configuration file. You must use this flag if you want to start the server with a configuration file other than the default /etc/httpd.conf file.
-r /etc/Printsrv/httpd.conf	This is used for the Infoprint Central HTTP server.
-nosec	This flag forces a base server. Security loads are bypassed.
-p port-number	This option means listen on this port number. The default port number is 80. This flag overrides the Port directive specified in the configuration file. Port 8080 will be used for Infoprint Central HTTP server.

```
//IPC      PROC WEB2='-p 8080 -nosec',
//         WEB1='-r /etc/Printsrv/httpd.conf',
// LEPARM='ENVAR("_CEE_ENVFILE=/etc/Printsrv/httpd.envvars")'
//*
//* The length of the subparameters passed must not exceed 100
//* characters:
//*
//WEBSRV    EXEC PGM=IMWHTTPD,REGION=OK,TIME=NOLIMIT,
//          PARM=('&LEPARM/&WEB1 &WEB2')
//*
//SYSIN     DD DUMMY
//OUTDSC    OUTPUT DEST=HOLD
//SYSPRINT DD SYSOUT=*,OUTPUT=(*.OUTDSC)
//SYSERR   DD SYSOUT=*,OUTPUT=(*.OUTDSC)
//STDOUT   DD SYSOUT=*,OUTPUT=(*.OUTDSC)
//STDERR   DD SYSOUT=*,OUTPUT=(*.OUTDSC)
//SYSOUT   DD SYSOUT=*,OUTPUT=(*.OUTDSC)
//CEEDUMP  DD SYSOUT=*,OUTPUT=(*.OUTDSC)
```

Figure 5-3   Sample startup procedure

5.2.2 z/OS HTTP Server environment variables file (httpd.envvars)

You must add or edit these environment variables in the z/OS HTTP Server environment variable file, httpd.envvars. If an environment variable already exists in the HTTP environment variables file, add the new values to the existing values, separating values with a colon (:).

The z/OS HTTP Server environment variable file, httpd.envvars, contains environment variables that affect Infoprint Central. The default location is /etc/httpd.envvars. The following list discusses the variables you might need to set in this file. Figure 5-4 on page 84 displays sample environmental variables.

You must always set the *required* variables (ICU_DATA, LIBPATH, and NLSPATH). You must set the optional variables only if the default values are not suitable for your installation.

AOPCENTRAL   This is the directory that contains Infoprint Central files. This environment variable is optional. If you installed Infoprint Server files in the default directory, you do not need to set this environment variable.

Default: AOPCENTRAL=/usr/lpp/Printsrv/InfoprintCentral

AOPCONF   This is the full path name of the Infoprint Server configuration file. This environment variable is optional. If you created the configuration file in the default location, you do not need to set this environment variable. The values in the z/OS HTTP Server environment variables file and in the aopstart EXEC must match.

Default: AOPCONF=/etc/Printsrv/aopd.conf

AOPLIMIT   This is the maximum number of objects that Infoprint Central displays after a search. This limit prevents the HTTP Server from timing out before Infoprint Central can display all objects that meet the users' search criteria. This environment variable is optional. You can specify a number from 1 to 9999. If you specify an incorrect value, the default value is used. Consider the following recommendations:

	► If Infoprint Central users ask to see more than 250 objects, try increasing the limit. If the higher limit causes the HTTP Server to time out, try increasing the HTTP Server's timeout value.
	► If the HTTP Server times out occasionally with the default limit, ask users to narrow their searches.
	► If the HTTP Server times out repeatedly with the default limit, lower the limit or try increasing the HTTP Server's timeout value.
	Default: AOPLIMIT=250
LIBPATH	Add these values to the existing values. Separate values with semicolons. The first two values refer to IBM XML Toolkit libraries:
	► /usr/lpp/ixm/IBM/xslt4c-1_9/lib
	► /usr/lpp/ixm/IBM/xml4c-5_5/lib
	► /usr/lpp/Printsrv/lib
NLSPATH	Add this value to the existing values: /usr/lpp/Printsrv/%L/%N
AOPCENTRAL_CODEPAGE	
	This environment variable is intended for customers who encode their inventory data using a code page other than IBM-1047. Specify the same code page for AOPCENTRAL_CODEPAGE that you specify in the LC_ALL or LC_CTYPE environment variable in the STDENV data set for the AOPSTART JCL procedure. The specification in the Language field on the Infoprint Server ISPF Configuration panel should also use this code page.
AOP_READ_COMMUNITY	
	This is the SNMP community name that allows read access to TCP/IP-attached printers. The SNMP read community name is required for Infoprint Central to display information from the printer (such as status, paper level, and model) and to display the turn online, turn offline, and reset printer actions. This environment variable is optional.
AOP_WRITE_COMMUNITY	
	This is the SNMP community name that allows write access to TCP/IP-attached printers. The SNMP write community name is required to turn printers online, offline, and reset them. This environment variable is optional.
ICU_DATA	This value refers to IBM XML Toolkit libraries.
	For example: /usr/lpp/ixm/IBM/xml4c-5_5/lib
LANG	This is the language used for messages. Infoprint Server provides messages in English and Japanese. Specify En_US for English messages, or Ja_JP for Japanese messages.
	Default: C (equivalent to En_US)
LC_ALL	This is the locale used to format time and date information in messages and the language of messages. Specify the same LC_ALL value in the environments for the Printer Inventory Manager and Infoprint Central. This locale overrides the locale in the LC_TIME variable.
	Default: C (also called POSIX)
LC_CTYPE	This is the locale that determines the EBCDIC code page used to validate Infoprint Server attribute values. Specify the same LC_CTYPE value in the environments for the Printer Inventory Manager and Infoprint Central. Also, specify a comparable value in the Language field on the Infoprint Server ISPF Configuration panel.
	LC_ALL does not override LC_CTYPE.

Default: C (also called POSIX)

LC_TIME   The locale used to format time and date information in messages. Specify the same LC_TIME value in the environments for the Printer Inventory Manager and Infoprint Central.

Default: C (also called POSIX)

TZ   The time zone used to format date and time information in messages displayed by Infoprint Central. Specify the same TZ value in the environments for the Printer Inventory Manager and Infoprint Central.

Default: The z/OS HTTP Server default is EST5EDT (Eastern U.S. time zone). The default for the Printer Inventory Manager is GMT0.

```
# You must put variables on one line in the httpd.envvars file.
#
# You cannot pass LE runtime options in httpd.envvars file. This file
# is read during httpd start up, and by that time, the LE runtime is
# already established for that process.
#
PATH=/bin:.:/usr/sbin:/usr/lpp/internet/bin:/usr/lpp/internet/sbin:/usr/lpp/lda
p/ldap/bin
NLSPATH=/usr/lib/nls/msg/%L/%N:/usr/lpp/internet/%L/%N:/usr/lpp/ldap/lib/nls/ms
g/%L/%N:/usr/lpp/Printsrv/%L/%N
LIBPATH=/usr/lpp/internet/bin:/usr/lpp/internet/sbin:/usr/lpp/ldap/lib:/usr/lpp/Printsrv
/lib:/usr/lpp/ixm/IBM/xml4c-5_5/lib:/usr/lpp/ixm/IBM/xslt4c-1_9/lib
#
SHELL=/bin/sh
TZ=EST5EDT
LANG=C
LC_ALL=en_US.IBM-1047
STEPLIB=CURRENT
GSKV3CACHESIZE=1024
GSKV2CACHESIZE=512
_BPX_SHAREAS=NO
HTTP_CONNECTION_PERCENTAGES=12,25,30,10,20
HTTP_CONNECTION_SIZES=192,584,1544,7168,33728
HTTP_MEMPOOL=32320
HTTPD_TMPDIR=/usr/lpp/internet/server_root/logs
#
# *   Infoprint Server Environment values needed
# **********************************************************
ICU_DATA=/usr/lpp/ixm/IBM/xml4c-5_5/lib
JAVA_HOME=/usr/lpp/java/J1.4
#
# InfoPrint Central Trace
# AOPTRACEON=1
# AOPTRACEDIR=/tmp
#
AOPCENTRAL=/usr/lpp/Printsrv/InfoprintCentral
AOPCONF=/etc/Printsrv/aopd.conf
AOPLIMIT=25
```

Figure 5-4   Sample environment variables

> **Important:** The AOPCONF, LC_ALL, LC_CTYPE, LC_TIME, and TZ environment variables in the HTTP Server environment variables file must match the variables specified in the environment for the `aopstart` command in the STDENV data set for the AOPSTART JCL procedure.

5.2.3 Infoprint Server configuration file

To use Infoprint Central, you must edit the Infoprint Server configuration file, aopd.conf. Add or edit the following attributes in the aopd.conf configuration file:

- ► **start-daemons = { ssid }** - These are the daemons which start when you run the `aopstart` command or AOPSTART JCL procedure. To use Infoprint Central, you must start the **aopssid** daemon. Add the ssid value to any existing values in this attribute.

  If you change this attribute while Infoprint Server is running, stop and restart all Infoprint Server daemons to pick up the change.

- ► **console-name = name** - This is the name of the extended MCS console that Infoprint Central uses to send commands to the z/OS system.

  - The console name must be 2 - 8 alphanumeric or national (#, $, and @) characters in length. The first character cannot be numeric.

  - Do *not* use these reserved names: HC, INSTREAM, INTERNAL, OPERLOG, SYSIOSRS, SYSLOG, UNKNOWN,SYSJ3D0x, and SYSJ3R0x.

  - If you change this attribute while the z/OS HTTP Server is running, restart the HTTP Server to pick up the change.

  Default: The printer inventory name (specified in the inventory attribute), followed by the last 4 characters of the system name. If the printer inventory name is AOP1 and the system name is MVSYS1, the default is AOP1SYS1.

5.2.4 Sample HTTP Server file configuration file

IBM recommends that you start your new Web server with copies of the sample httpd.conf and httpd.envvars files shipped with the product before you manually add changes. After the Web server can be started, you can add variables and you can change variables as outlined. The Web server must be restarted to pick up changes made in http.envvvars.

Specify _BPX_SHAREAS=NO to prevent z/OS UNIX System Services from loading spawned programs into the Web server address space, because when these programs are not marked as program-controlled, the Web server receives error code 02AF.

> **Important:** Values in the z/OS HTTP Server environment variables file and in the aopstart EXEC must match.

5.2.5 Customize the HTTP Server configuration file

The Service, ServerInit, Pass, and AddType directives for Infoprint Central are required. Add these directives to the HTTP Server configuration file in the method shown in the examples Appendix B.1, "Sample httpd.conf file" on page 164. After you update this configuration file, restart the HTTP Server so that your changes take effect.

Notes:

- ► Add the Pass directives *before* the ServerInit and Service directives.
- ► Do not add the Pass directives in the section indicated in the configuration file comments for Pass directives.
- ► If any of the AddType directives already exist, then delete or comment out the existing directives so that the directives suitable for Infoprint Central are used. Notice that the .css directive is present in the default configuration file.

Appendix B, "Sample HTTP Server configuration file" on page 163 contains a sample configuration file.

Update the Service Directive section

Add the following directives to the HTTP Server configuration file in the order shown.

- ► In the Service Directives section of the file, add these directives.

  Add these Pass directives before the ServerInit and Service directives and before the generic Pass directive, Pass /*.

  Do *not* add these Pass directives in the section indicated for Pass directives in the comments of the HTTP Server configuration file.

```
Pass  /Infoprint/Scripts/*    /usr/lpp/Printsrv/InfoprintCentral/Scripts/*
Pass  /Infoprint/Images/*     /usr/lpp/Printsrv/InfoprintCentral/Images/*
Pass  /Infoprint/help/En_US/* /usr/lpp/Printsrv/InfoprintCentral/help/En_US/*
Pass  /Infoprint/En_US/*.html /usr/lpp/Printsrv/InfoprintCentral/html/En_US/*.html
# ====================================================================
# Printsrv directives
# ====================================================================
ServerInit                    /usr/lpp/Printsrv/lib/aopcentral.so:initialize*
Service /Infoprint*           /usr/lpp/Printsrv/lib/aopcentral.so:dllMain*
```

Note: Infoprint Central writes error messages to the z/OS HTTP Server log file, httpd-errors.date. The default location is /usr/lpp/internet/ServerInit/logs/httpd-errors.date.

Update the AddType directives

- ► In the section that contains AddType directives, add these directives at the end of the section.

  If any of these directives already exist, delete or comment out the existing directives so that the directives suitable for Infoprint Central are used. Notice that the .css directive is present in the default configuration file.

```
AddType .js  application/x-javascript  ebcdic 1.0 # JavaScript
AddType .htc text/x-component          ebcdic 1.0 # .htc files
AddType .css text/css                  ebcdic 1.0 # cascading style sheets
```

Note: File /usr/lpp/Printsrv/samples/httpd.conf.updates contains the required directives.

Additional directives for consideration

You can add those directives to an already configured HTTP configuration file. If you do not use an already-configured HTTP configuration file, then also check the following parameters.

AccessLogExpire,ErrorLogExpire,ReportDataExpire

Use this directive to specify that you want to remove log files when they reach a certain age (in days)

AccessLog, Agentlog, RefererLog, ErrorLog, CgiErrorLog
    If you want logging, use this directive to specify the path and file name where you want the server to log messages.

OutputTimeout   Use this directive to set the maximum time allowed for your server to send output to a client.

SAFExpTime   This directive controls the duration of the validity of SAF group files. Groups defined in SAF are refreshed after this period of time.

DoReporting   If you want your server to automatically generate reports, set the DoReporting directive to on. If enabled, the server will use the default reporting program, unless you specify a replacement program using the LoggingReportingProgram directive

Update UserID directive

The default UserID directive, UserId %%CLIENT%%, in the HTTP Server configuration file allows only users with a valid z/OS user ID use Web pages. This directive is suitable for Infoprint Central.

As an alternative, you can specifically protect Infoprint Central Web pages by including a Protect directive for the Infoprint Central pages.

```
UserId        %%CLIENT%%
```

Update Protection directive section

The z/OS HTTP Server lets you use any of several methods to protect Web pages. You can use a protection method that provides Infoprint Central with a unique z/OS user ID and password that has been authenticated by RACF or a similar security system.

Use this directive to define a protection setup within the configuration file. You give the protection setup any name (AOP_USER, for example) and define the type of protection using protection subdirectives.

> **Note:** In the configuration file, you must place Protection directives before any DefProt or Protect directives that point to them.
>
> The name you select is associated with this protection setup. The name can then be used by subsequent DefProt and Protect directives, shown in "Update Protect directive" on page 88, to point to this protection setup.

This directive is suitable for Infoprint Central. As an alternative, you can specifically protect Infoprint Central Web pages by including a Protect directive for the Infoprint Central pages.

```
Protection AOP_USER    {
           Serverid    InfoPrint_Server_Operation
           UserID      %%CLIENT%%
           AuthType    Basic
           GroupFile   %%SAF%%
           PasswdFile  %%SAF%%
           Mask        AOPOPER, AOPADMIN, ADMIN, admin
                       }
```

If you code %%SAF%% on the GroupFile subdirective, the groups named in the Mask directive must have an OMVS segment. Notice that you should specify the user IDs with both uppercase and lowercase letters so that users can log on using either case.

Use the Mask subdirective to specify valid user names or groups that are then authorized to access Infoprint Central.

> **Note:** Specify the Protection template *before* the Pass and ServerInit directives for Infoprint Central. This template allows only z/OS user ID ADMIN and all users of the z/OS group AOPOPER and AOPADMIN use Infoprint Central Web pages. You can use groups in a Protection directive only when you define the groups in a group file, in an LDAP server, or in SAF.
>
> The directive SAFExpTime is used to force automatic periodic reloading of SAF groups into storage. That is, users may have access to Infoprint Central until this directive expires, or have to wait until access is granted.

Update Protect directive

The server compares an incoming client request to the template on the protect directive. If the server finds a match between the incoming request and the template, the server continues to check subsequent Protect directives for additional matches. The server uses the last matching Protect directive for activating protection, so it is good practice to put your most restrictive Protect directives last.

Use the Protect directive to activate protection setup rules for requests that match a template.

```
Protect /Infoprint* AOP_USER
```

On the Protect directive, you can add an access control user to which the server should change when serving the request. This allows z/OS UNIX file protection to restrict access. This user ID will be used for controlling access to MVS resources, and must include a z/OS UNIX segment containing the UID and GID to be used for controlling access to HFS files.

5.3 Using Infoprint Central

After the HTTP server has been started, you should be able to log on to Infoprint Central. To log on to Infoprint Central, enter a URL in the browser:

► For the English version:

```
http://hostname:port/Infoprint/En_US/IPS.html
```

If the HTTP Server uses Secure Sockets Layer (SSL):

```
https://hostname:port/Infoprint/En_US/IPS.html
```

► For the Japanese version:

```
http://hostname:port/Infoprint/Ja_JP/IPS.html
```

If the HTTP Server uses Secure Sockets Layer (SSL):

```
https://hostname:port/Infoprint/Ja_JP/IPS.html
```

Where:

hostname   This is thee address of the z/OS system where the HTTP Server is running.

port   This is the port where the HTTP Server receives requests. If the HTTP Server receives requests at the default port, you can omit the port number.

The default port number depends on whether you have customized the HTTP Server to use Secure Sockets Layer (SSL):

► The SSL default port is 443.
► Otherwise, the default port is 80.

URL examples

These examples are using the default port number 80 and go to the same z/OS system.

```
http://9.12.4.49/Infoprint/En_US/IPS.html
http://wtsc65oe.itso.ibm.com/Infoprint/En_US/IPS.html
```

Using a port that is not the default

I f you specify a port number other than 80, then you must specify the port number in the URL. In Figure 5-3 on page 82, the port number is 8080. For that example, the URL should be:

```
http://9.12.4.54:8080/Infoprint/En_US/IPS.html
http://wtsc43oe.itso.ibm.com:8080/Infoprint/En_US/IPS.html
```

5.3.1 Web browser access to Infoprint Central

The Web browser specifies the name specified on the ServerID so users know which protection scheme they must provide a given user ID and password for. Note, if you omit the ServerID subdirective, the Web server creates a default name of UNKNOWN.

Figure 5-5 on page 90 displays `Serverid    InfoPrint_Server_Operation`, as specified in the

Web browser access to Infoprint Central

When you log on to Infoprint Central, you can log on to only one z/OS system. You can see all the print jobs, printer queues, and Infoprint Server messages for that one z/OS system only. Therefore, if you configure IP PrintWay extended mode to print on the same printers from different z/OS systems, you must open separate instances of your Web browser so that you can see all print jobs on a printer's queue and all messages from IP PrintWay about a printer.

From the Web browser, enter a URL as follows:

```
http://hostname:port/Infoprint/En_US/IPS.html
```

For example:

```
http://wtsc65.itso.ibm.com/Infoprint/En_US/IPS.html
```

> **Note:** If the HTTP Server receives requests at the default port, you can omit the port number in the URL. The default port number depends on whether you have customized the HTTP Server to use Secure Sockets Layer (SSL).

When the panel shown in Figure 5-5 on page 90, enter a TSO/E user ID and password. The user ID that is specified must be in the `Mask` specification in "Update Protection directive section" on page 87. The `Mask` specification contains either user IDs or group IDs and the User name in Figure 5-5 on page 90 must be defined there.
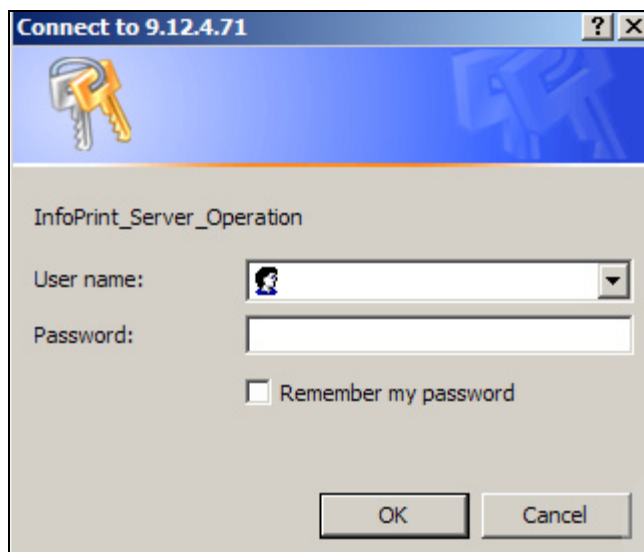
Figure 5-5   Infoprint Central logon prompt

> **Note:** To encrypt and decrypt information that passes between the user's browser and the HTTP Server, you can customize the HTTP Server to use the Secure Sockets Layer (SSL) protocol.

5.3.2 Customizing a Web browser

Customize the browser's Internet settings. However, depending on your Web browser, you might not be able to customize some of these settings. Infoprint Central requires that the browser supports JavaScripts and Style Sheets. Both functions must be enabled. Do not block or disable all cookies. Infoprint Central stores cookies on your system to save your search values. If cookies are enabled, then your search criteria are kept if saved once.

Request that your browser always retrieve the latest pages from the Web so that the Infoprint Central refresh function works correctly. Otherwise, you might not see the latest information when you refresh a page. If you use Microsoft Internet Explorer, change the setting for temporary Internet files to check for newer versions of stored pages to "Every visit to the page." Do not use the Microsoft default setting, which is to check for newer versions of stored pages automatically. Also, if you use Microsoft Internet Explorer, do *not* disable the meta refresh security option. Infoprint Central uses the meta refresh function to display your search results automatically.

As shown in Figure 5-6 on page 91, at the Internet Options window, in the Temporary Internet files section click **Settings...**. At the Settings window, under the Check for newer versions of stored pages: section, check `Every visit to the page`.
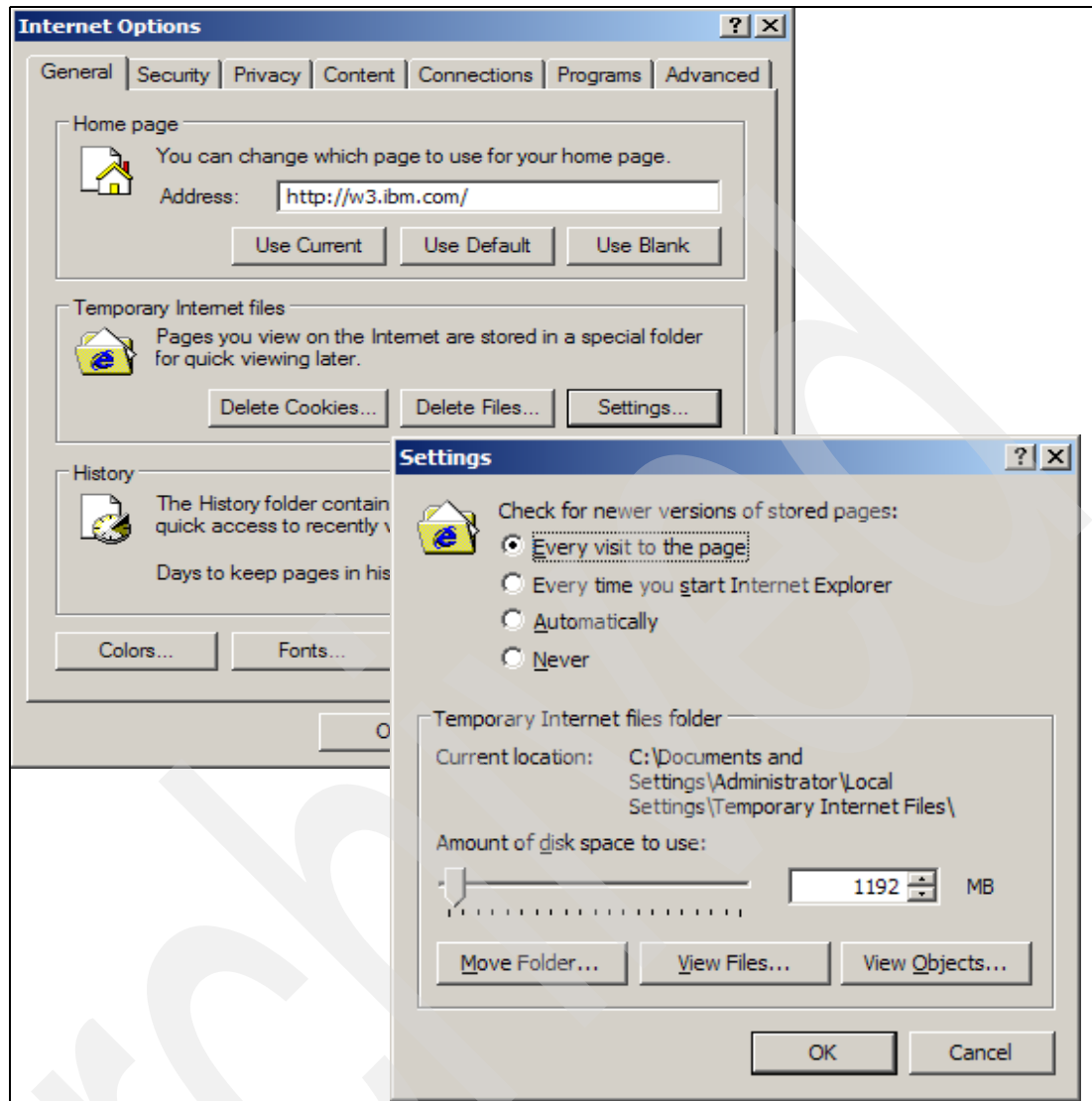
Figure 5-6   Internet Options - Settings

5.4 Working with Infoprint Central and security

Infoprint Central is a Web-based print management system primarily designed for help desk operators. However, other authorized users or job submitters can also use Infoprint Central.

Print management on z/OS

When you log on to Infoprint Central, you can log on to only one z/OS system. You can see all the print jobs, printer queues, and Infoprint Server messages for that one z/OS system only. To see print jobs, printer queues, and messages for more than one system, you can open separate instances of your Web browser and log on to several z/OS systems at a time. Infoprint Central requires the z/OS HTTP Server and a Web browser. No applications other than a Web browser need to be installed on users' workstations.

Working with printers

You can find and work with printers that are defined in the Printer Inventory, including IBM AFP printers controlled by PSF (called PSF printers), and TCP/IP-attached or SNA-attached printers to which IP PrintWay extended mode sends print jobs (called IP PrintWay printers). If you run IP PrintWay extended mode, use Infoprint Central because it lets you work with IP PrintWay extended mode printers. It also lets you work with output data sets that IP PrintWay extended mode is currently processing and displays the status of output data sets, including whether IP PrintWay has retained them.

Working with print jobs

You can find and work with print jobs that are on the JES spool. Plus, you can see more information about print jobs that Infoprint Server processes. For example, you can see whether an Infoprint Server print job completed successfully and where it printed even if the print job is no longer on the JES spool. You can use several different search criteria to find print jobs. After you find a print job, you can delete, hold, release, move, or change the priority of the print job. And, you can see all messages from Infoprint Server for that one print job.

Help desk operators and authorized users

Infoprint Central allows help desk operators and other authorized users or job submitters to work with print jobs, printers, and NetSpool logical units (LUs); display printer definitions; and check system status.

5.4.1 Defining Infoprint Central users as z/OS UNIX users

You must define users of Infoprint Central to RACF as z/OS UNIX users. Infoprint Central users do not need to be authorized to use TSO. If you give users temporary RACF passwords, be sure to explain to users how to rlogin or telnet to the z/OS system to change the password the first time. The z/OS HTTP Server does not let users change passwords from the logon window.

5.4.2 Authorizing users using Infoprint Central

Some Infoprint Central actions require that users be authorized to read the Printer Inventory. These actions include the following:

► Viewing PSF printers
► Printer definitions
► Printer pool definitions
► IP PrintWay job selection rules

To authorize users to read the Printer Inventory, using either Infoprint Central or Infoprint Server ISPF panels, give the AOP.ADMINISTRATOR profile in the PRINTSRV class universal READ access or give all Infoprint Central users READ access.

```
RDEFINE PRINTSRV(AOP.ADMINISTRATOR) UACC(NONE)
PERMIT AOP.ADMINISTRATOR CLASS(PRINTSRV) ACCESS(READ) ID(userid or groupid)
SETROPTS RACLIST(PRINTSRV) REFRESH
```

Access to printers

You can define profiles in the PRINTSRV class to restrict who can work with printers. Profiles in the PRINTSRV class can apply to both IP PrintWay and PSF printers. You can define a separate profile to protect each printer, or you can define one profile to protect a group of printers or all printers. For example, if you want to authorize different users to work with printers in different locations, define separate profiles for printers in each location. You could

define one profile for all printers in one location, and another profile for all printers in another location. If you want to authorize the same group of users to work with all printers, you need to define only one profile.

5.4.3 Operator security profiles for IP PrintWay and PSF printers

Infoprint Central allows users to work with printers that IP PrintWay controls (called IP PrintWay printers) and with printers that PSF for z/OS controls (called PSF printers). You can protect IP PrintWay and PSF printers with profiles in these classes, as follows:

► Specify a security profile in the PRINTSRV class in the Protocol panel for IP PrintWay printers, as shown in Figure 5-7 on page 94. You can specify a security profile in the PRINTSRV class in the FSA Definition panel for PSF printers, as shown in Figure 5-8 on page 94.

► Give the profile universal READ access if you want all Infoprint Central users to be able to view properties of the printer.

► When defining these profiles, determine whether to define a profile for each printer, or define one profile for a group of printers or all printers.

> **Note:** If you define profiles in both classes, users must have access to both profiles to perform actions on PSF printers. You can select any name for the profile that RACF allows. However, do not start the name with AOP to avoid conflict with profile names that IBM uses now or in the future. Profile names can be up to 64 characters in length.

In the Protocol panel shown in Figure 5-7 on page 94, specify the name of a RACF resource profile in the PRINTSRV class. Only users connected to this profile can display and work with this printer using z/OS Infoprint Central for the Web. This field is not required.

You can define a separate profile to protect each printer, or you can define one profile to protect a group of printers or all printers. To authorize users to a group of printers, specify the same profile name in the IP PrintWay printer definitions and PSF FSA definitions for all printers in the group. If more than one printer definition exists for a printer, specify the same profile name in each printer definition. If you specify a profile name that is not defined to RACF, or if this field is blank, anyone can work with this printer. This field does not apply to IP PrintWay basic mode or e-mail.

Protocol panel for IP PrintWay printers

In Figure 5-7 on page 94, the POK.ROOM1 security profile definition shown is for a group of printers in ROOM1, and POK is just a name for the location. If you want to authorize different users to work with printers in different locations, define separate profiles for printers in each location. If you want to authorize the same group of users to work with all printers, you need to define only one profile.

► One profile to protect a single printer

```
RDEFINE PRINTSRV (POK.PRT1) UACC(NONE)
PERMIT POK.PRT1 CLASS(PRINTSRV) ACCESS(READ) ID(userid or groupid)
```

► For printers groups or all printers

```
RDEFINE PRINTSRV (POK.ROOM1) UACC(NONE)
PERMIT POK.ROOM1 CLASS(PRINTSRV) ACCESS(READ) ID(userid or groupid)
```

```
Edit                              LPR Protocol
Command ==> _____

Printer definition name . POK45ANE_____
Operator security profile
    . . . POK.ROOM1_____



Printer IP address . 9.12.6.3_____ (extend)
Print queue name . . afccu2_____ (extend)
```

Figure 5-7   Protocol panel for IP PrintWay printers

Note: To specify the same operator security profile in a group of IP PrintWay printer definitions, create a Protocol component with the name of the security profile and specify that Protocol component in all the printer definitions. Creating a component makes it easier to change the name of the profile if necessary.

FSA Definition panel for PSF printers

In Figure 5-8, specify the name of a RACF resource profile in the PRINTSRV class. Only users connected to this profile can use Infoprint Central to display and work with this PSF printer. (In Infoprint Central, a "PSF printer" can refer to an AFP printer or to AFP Download Plus.) This field is not required.

To authorize the same users to a group of printers, specify the same profile name in the PSF FSA definitions and the IP PrintWay printer definitions for all the printers in the group. To work with any PSF printer, users must be connected to the JES2 or JES3 profiles in the OPERCMDS class. This is true whether or not you specify a profile in this field.

```
Add                             PSF FSA, TCP/IP
Command ==> _____

FSA Name. . . _____
Description . _____ (extend)
Location. . . _____ (extend)
                                                          More:     +
Operator security profile
    . . . _____
```

Figure 5-8   FSA Definition panel for PSF printers

5.4.4 PIDU command and operator security profiles

You can use the `pidu` command to specify the name of the same RACF profile in all IP PrintWay printer definitions that do not already contain a profile name, as explained here.

First, enter the OMVS shell, then type these commands as one command on the z/OS UNIX command line:

```
pidu -qc "list printer where printer-type=ip-printway and
operator-security-profile=null;" | awk'{print "modify printer " $1
" operator-security-profile = \"POK>ROOM1\";"}' > /tmp/defs
```

The `pidu list` command lists the names of all IP PrintWay printer definitions with no value in the operator-security-profile attribute. These names are piped to the awk program, which

writes modify commands to modify the printer definitions to file /tmp/defs. Then, perform these tasks:

1. Inspect the /tmp/defs file to make sure the modify commands are acceptable.
2. Enter this command to update the Printer Inventory:
   ```
   pidu < /tmp/defs
   ```

awk command

The **awk** command is a powerful command that can perform many different operations on files. The general purpose of **awk** is to read the contents of one or more files, obtain selected pieces of information from the files, and present the information in a specified format.

```
pidu < /tmp/defs
```

5.4.5 Security access to printer actions

Table 5-1 lists the printer actions that authorized users can perform using Infoprint Central, as well as the minimum access required to the printer's profile in the PRINTSRV class.

> **Note:** You must define users of Infoprint Central to RACF as z/OS UNIX users. Some Infoprint Central actions require that users be authorized to read the Printer Inventory. These actions include viewing PSF printers, printer definitions, printer pool definitions, and IP PrintWay job selection rules.

Table 5-1   Infoprint Central printer actions and the minimum access required

Using Infoprint Central, a user can do the following	Access required
Find and display printers	READ
Ping a printer and run traceroute	READ
Redirect a job to another IP PrintWay printer	CONTROL
Restore IP PrintWay printers	CONTROL
Start and stop printers	CONTROL
View the log for IP PrintWay printers	READ
View printer properties	READ
Space, repeat, pause, interrupt PSF printers	CONTROL
Change forms, job selection for PSF printers	UPDATE
Stop printer and delete or hold the current print job	CONTROL
Turn online, turn offline, and reset printers	CONTROL

> **Note:** To give users access to perform all printer actions, give CONTROL access to the RACF profile.

5.4.6 Creating a search database

Infoprint Server maintains a search database that lets Infoprint Central find objects in the Printer Inventory. You must run the z/OS UNIX **sdbu -z** command to create this search database. To use the **sdbu** command, you must be connected to the RACF AOPADMIN

group or have an effective UID of zero (0). The Infoprint Server search database daemon (aopsdbd) must also be started. This daemon starts automatically when you run the **aopstart** command or the AOPSTART JCL procedure.

Create the search database

To create the search database, follow these steps:

- ► If you are not connected to the required RACF groups, switch to an effective UID of zero (0). To use the **su** command, you must be permitted to the BPX.SUPERUSER profile in the FACILITY class in RACF.

- ► Start Infoprint Server daemons if they are not already started.

- ► Create the search database.

      sdbu -z

  The search database files in the /var/Printsrv/searchdb directory are created.

If the search database daemon (aopsdbd) fails, you must run the **sdbu** command again to recreate the search database.

5.4.7 Customizing PSF for z/OS to use Infoprint Central

If you want to use Infoprint Central to work with IBM AFP printers that PSF for z/OS controls (called PSF printers), you must customize PSF for z/OS to use the Printer Inventory.

To customize PSF for z/OS to use the Printer Inventory:

- ► Create a PSF FSS definition for each PSF functional subsystem in the Printer Inventory.

- ► Create a PSF FSA definition for each PSF printer in the Printer Inventory.

- ► Edit your PSF startup procedures to specify that PSF is to obtain printer information from the Printer Inventory.

  To use the Printer Inventory with PSF, change the printer startup procedure to specify INV=piname as the first parameter in the PARM field of the EXEC statement:

      //   EXEC PGM=APSPPIEP,PARM=('INV=piname')

  where `piname` is the four-character name of the Printer Inventory

  The INV=piname parameter indicates that PSF uses the Printer Inventory and obtains parameters from the specified Printer Inventory for each printer in the startup procedure. No other parameters in the PARM field are used when PSF uses the Printer Inventory.

  Restart your PSF printers after you have started the Infoprint Central daemon (daemon aopssid). This is necessary because Infoprint Server automatically enables SNMP reporting (SNMP reporting option in the PSF FSA definition) if the Infoprint Central daemon is started. You must restart PSF printers after SNMP reporting has been enabled.

- ► You can use the Infoprint Server migration program, aopmig, to create the required PSF FSS and FSA definitions in the Printer Inventory.

- ► You can use Infoprint Server ISPF panels or the Printer Inventory Definition Utility (PIDU) to create and edit FSS and FSA definitions

- ► You do not need to create PSF printer definitions in the Printer Inventory to use Infoprint Central. Printer definitions are required only if you want to print to PSF printers using Print Interface or NetSpool.

5.4.8 Customizing JES3 console standards (CONSTD statement)

The CONSTD statement in the JES3 initialization stream allows you to define standards for your JES3 console configuration. The EDIT parameter of the CONSTD statement lets you specify special characters to be used in editing commands processed by JES3 console services. If you code the EDIT parameter on the CONSTD statement, you must define an escape character so that Infoprint Central can escape special characters in filenames. You can omit the EDIT parameter, in which case JES3 uses the default escape character, which is the quotation mark (").

To specify the quotation mark (") as the escape character and the pound sign (#) as the backspace character, code:

```
EDIT=("",#,,)
```

5.4.9 Authorizing the AOPOPER group to RACF profiles

The user who starts Infoprint Server must be a member of the AOPOPER RACF group, or have a UID of zero (0). AOPOPER is the default group name for Infoprint Server operators. However, your installation can assign a different name to this group. Therefore, you can give the AOPOPER group access to the profiles in the OPERCMDS and JESSPOOL classes as shown in these examples.

If someone with a user ID of zero (0) who is not a member of the AOPOPER group starts Infoprint Server, also give that user access to the profiles. If you start Infoprint Server in the /etc/rc file, give the user ID ROOT access to the profiles.

Authorizing JES commands
Follow these steps to authorize the AOPOPER group to JES commands.

► Give the RACF group for Infoprint Server operators (AOPOPER group) access to profiles that protect all operator commands that Infoprint Central uses.

Examples: If the group name for Infoprint Server operators is AOPOPER, enter these RACF commands to give this group UPDATE access to broad profiles in the OPERCMDS and JESSPOOL classes:

JES2:

```
PERMIT JES2.*.*     CLASS(OPERCMDS) ACCESS(UPDATE) ID(AOPOPER)
PERMIT MVS.MODIFY   CLASS(OPERCMDS) ACCESS(UPDATE) ID(AOPOPER)
PERMIT MVS.VARY.NET CLASS(OPERCMDS) ACCESS(UPDATE) ID(AOPOPER)
```

JES3:

```
PERMIT JES3.*.*     CLASS(OPERCMDS) ACCESS(UPDATE) ID(AOPOPER)
PERMIT JES3.*.*.*   CLASS(OPERCMDS) ACCESS(UPDATE) ID(AOPOPER)
PERMIT MVS.MODIFY   CLASS(OPERCMDS) ACCESS(UPDATE) ID(AOPOPER)
PERMIT MVS.VARY.NET CLASS(OPERCMDS) ACCESS(UPDATE) ID(AOPOPER)
PERMIT N1.*.*.*.D*.* CLASS(JESSPOOL) ACCESS(UPDATE) ID(AOPOPER)
```

► Refresh the OPERCMDS and JESSPOOL classes.

JES2:

```
SETROPTS RACLIST(OPERCMDS) REFRESH
```

JES3:

```
SETROPTS RACLIST(OPERCMDS JESSPOOL) REFRESH
```

If you permit the AOPOPER group to profiles while the Infoprint Central daemon (aopssid) is started, stop and restart it to pick up the changes.

5.4.10 Setting up security for NetSpool logical units (LUs)

Infoprint Central lets users work with NetSpool logical units (LUs). You can define the AOP.NETSPOOL profile to restrict who can display, start, and stop NetSpool LUs.

```
RDEFINE PRINTSRV (AOP.NETSPOOL) UACC(NONE)
PERMIT AOP.NETSPOOL CLASS(PRINTSRV) ACC(CONTROL) ID(userid or groupid)
SETROPTS RACLIST(PRINTSRV) REFRESH
```

Recommendation: Define the AOP.NETSPOOL profile. Otherwise, any Infoprint Central user can display, start, and stop NetSpool LUs.

As previously mentioned, to authorize users to read the Printer Inventory, using either Infoprint Central or Infoprint Server ISPF panels, give the AOP.ADMINISTRATOR profile in the PRINTSRV class universal READ access, or give all Infoprint Central users READ access.

User access to the AOP.NETSPOOL resource profile
To allow users to display, start, and stop NetSpool LUs, enter this RACF command:

```
PERMIT AOP.NETSPOOL CLASS(PRINTSRV) ACCESS(CONTROL) ID(userid or group)
```

Note: If a user has UPDATE access to the AOP.NETSPOOL profile, the AOP.ADMINISTRATOR profile is not checked.

5.4.11 Setting up security for IP PrintWay job selection rules

Infoprint Central lets administrators work with IP PrintWay job selection rules. IP PrintWay job selection rules control which print jobs IP PrintWay extended mode selects to process from the JES spool. You can define RACF profiles to restrict who can start and stop job selection rules.

Note: Define profiles to protect job selection rules. Otherwise, any Infoprint Central user who is authorized to read the Printer Inventory can display, start, and stop job selection rules.

Define resource profiles in the PRINTSRV class
You can define a separate profile for each job selection rule, or you can define one profile for several or all job-selection rules. You can use the same profiles that you defined for printers if you want the same groups of users to start and stop job-selection rules.

You specify the RACF resource profile that applies to each rule in the job selection rule definition in the Printer Inventory, as shown in Figure 5-9 on page 99. Read access to AOP.ADMINISTRATOR profile grants job selection rule displays.

Select any name for the profile that RACF allows. However, do not start the name with AOP, to avoid conflict with profile names that IBM uses. Profile names can be up to 64 characters. For example, to define a profile named POK.CLASSY for job-selection rule class-y, enter this RACF command:

```
RDEFINE PRINTSRV (POK.CLASSY) UACC(NONE)
```

To start and stop job-selection rules, give CONTROL access to the profile. READ access has no meaning for profiles that control job selection.

```
PERMIT POK.CLASSY CLASS(PRINTSRV) ACCESS(CONTROL) ID(userid or groupid)
SETROPTS RACLIST(PRINTSRV) REFRESH
```

```
Add                           Job Selection Rule
Command ==> _____

Rule name . . Class-Y_____
Description . Start all jobs in class Y_____ (extend)
Operator security profile
    . . . POK.CLASSY_____

DEST. . . EMAIL10_
CLASS . . Y _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
          _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
FORMS . . _____ _____ _____ _____
          _____ _____ _____ _____
Creator . ROGERS__
WRITER. . _____

DEST IP address .  3  1. Include  2. Exclude  3. Ignore
```

Figure 5-9   Job Selection Rule panel

PIDU command to create a job selection rule

If you prefer to use the `pidu` command, Figure 5-10 shows the specification of a job selection rule using the `pidu` command instead of the Infoprint Server ISPF application shown in Figure 5-9.

```
create job-selection-rule class-y
       job-selection-status =
       output-class-list = Y
       creator-userid = ROGERS
       dest-ip-address =
       destination-pattern = EMAIL10
       forms-list =
       jes-writer-pattern =
       operator-security-profile = POK.CLASSY
       description = "Start all jobs in class y" ; '
;
```

Figure 5-10   Syntax to create a job selection rule

Listing created job selection rules

The panel shown in Figure 5-11 on page 100 lists all the job selection rules. IP PrintWay uses the job selection rules to determine which print jobs to select from the JES spool for printing. The attributes of the print job must match all of the values in a rule to be selected. This panel applies only to IP PrintWay extended mode.

```
                                Job Selection Rule List              Row 1 to 2 of 2
Command ===> _____            Scroll ===> HALF

Actions:
  A-Add  B-Browse  C-Copy  D-Delete  E-Edit
A Rule Name          DEST     Description
= ================= ======== ================================================
_ Class-Y            EMAIL10  Start all jobs in class Y
_ SAPI               *        Job Selection rule for SAPI interface
****************************** Bottom of data ********************************
```

Figure 5-11   Job Selection Rule List panel

Figure 5-12 shows a `pidu` command to display a job selection rule specification.

```
ROGERS:/u/rogers: >pidu -c "display job-selection-rule Class-Y;"

# display job-selection-rule Class-Y
   output-class-list = {
      Y
   }
   operator-security-profile = POK.CLASSY
   destination-pattern = EMAIL10
   creator-userid = ROGERS
   description = "Start all jobs in class Y"
ROGERS:/u/rogers: >
```

Figure 5-12   The pidu command to display a job selection rule

5.4.12 Infoprint Central security checks

With Infoprint Central, you can protect who is authorized to access and control the following functions:

► Start and stop Infoprint Server daemons
► Display of printer and printer pool definitions
► Allow RACF auditing for access failures
► Allow access to change priority of print jobs

Setting up security for Infoprint Server daemons

Infoprint Central lets users display the status of Infoprint Server daemons to see whether they are started. You can define the resource profile AOP.DAEMON in the PRINTSRV class to restrict who can display daemons. If you do not define profile AOP.DAEMON, any Infoprint Central user can display the status of daemons. Infoprint Central does not let users start and stop daemons.

To authorize users to display the System Status, use the following profiles.

```
RDEFINE PRINTSRV AOP.DAEMON UACC(NONE)
PERMIT AOP.DAEMON CLASS(PRINTSRV) ACCESS(READ) ID(userid or groupid)
SETROPTS RACLIST(PRINTSRV) REFRESH
```

Note: If the Defined field contains Yes or N/A and the Status field contains Stopped, the daemon or task might have ended abnormally or the operator might have stopped it. Ask your operator to start Infoprint Server daemons or the NetSpool task.

If the Defined field contains No and you think the daemon should be started, ask your administrator to define the daemon in the Infoprint Server configuration file and then restart Infoprint Server daemons.

Figure 5-13 shows the display of the Infoprint Server daemons when selecting the System Status button. This panel displays the status of all Infoprint Server daemons and NetSpool tasks. This section is displayed only if your administrator has given you authority to see the status of Infoprint Server daemons. This panel lets you check whether Infoprint Server daemons and tasks are started.

Note: You cannot start and stop daemons or tasks from this panel. Ask your operator to start daemons with the `aopstart` command or AOPSTART procedure.

Figure 5-13   Infoprint Central panel to display System Status of daemons

Setting up security for printer and printer pool definitions

Infoprint Central lets users display printer definitions and printer pool definitions in the Printer Inventory. Users can only display information in these definitions; they cannot change information.

Any Infoprint Central user who is authorized to read the Printer Inventory can display printer definitions and printer pool definitions.

You must define the AOP.ADMINISTRATOR profile in the RACF PRINTSRV class to protect access to the Printer Inventory, as follows:

```
RDEFINE PRINTSRV(AOP.ADMINISTRATOR) UACC(NONE)
PERMIT AOP.ADMINISTRATOR CLASS(PRINTSRV) ACCESS(READ) ID(userid or groupid)
SETROPTS RACLIST(PRINTSRV) REFRESH
```

READ This access lets users view the Printer Inventory using ISPF panels, Infoprint Central, or the Printer Inventory Definition Utility (PIDU). Users do not need READ access simply to list names of printer definitions with the **lpstat** command or with Infoprint Port Monitor.

UPDATE This access lets users update the Printer Inventory using ISPF panels or PIDU, and lets users view the Printer Inventory using Infoprint Central.

Requesting RACF notification and auditing

Infoprint Central checks a user's access to profiles before it displays any objects (such as printers or print jobs) and action buttons on its Web pages. It then displays only those objects and actions to which the user has access.

For the RACF profile that Infoprint Central checks, you must decide whether RACF should:

► Notify the security administrator (with a message) if an access check fails. If you want to receive RACF messages about access check failures in Infoprint Central, you must specify the RACF NOTIFY parameter for the profile. If the NOTIFY parameter is not specified, Infoprint Central suppresses RACF messages for access check failures.

► Log access checks to resources that are protected by the profile. Infoprint Central logs access checks as directed by the RACF AUDIT parameter for the profile.

Recommendation: Do not request notification or logging for RACF profiles that Infoprint Central checks. As an alternative, request that RACF log only access check failures greater than READ. This is because access check failures can be a normal occurrence as Infoprint Central builds its Web pages and determines which objects and actions to display. RACF messages and audit entries do not necessarily mean that the user asked to display an object or selected a printer action protected by the profile.

In addition, if you request notification (NOTIFY), you might receive numerous RACF messages for the same user and RACF profile because Infoprint Central sometimes checks the same profile numerous times as it builds Web pages.

Priority of print jobs

Infoprint Central lets these job submitters do all actions on their own print jobs, regardless of whether they have access to the profiles that protect their print jobs. The AOP.PRIORITY profile is an exception. If you define the AOP.PRIORITY profile, job submitters must have UPDATE access to this profile to change the priority of their own print jobs.

Infoprint Central lets users change the priority of print jobs. To restrict who can change the priority of a print job, you can define the AOP.PRIORITY profile in the PRINTSRV class. If you do not define the AOP.PRIORITY profile, the job submitter and any other user with the required access to profiles in the OPERCMDS and JESSPOOL classes can change the priority of a print job.

```
RDEFINE PRINTSRV (AOP.PRIORITY) UACC(NONE)
PERMIT AOP.PRIORITY CLASS(PRINTSRV) ACCESS(UPDATE) ID(userid or groupid)
SETROPTS RACLIST(PRINTSRV) REFRESH
```

5.5 Work with Printers panel

Figure 5-14 is the first panel displayed after you log on to Infoprint Central. You can work with these types of printers:

PSF printers A Print Services Facility™ (PSF) printer is an IBM Advanced Function Presentation (AFP) printer that PSF for z/OS controls. You can work with any PSF printer that your administrator has defined to both Infoprint Server and z/OS. Each PSF printer must be defined in an FSA definition in the Printer Inventory and in a JES initialization statement.

IP PrintWay printers An IP PrintWay printer is typically: 1) a PCL or PostScript® printer in your TCP/IP network, or 2) VTAM-controlled printer in your SNA network. You can work with any IP PrintWay printer that your administrator has defined to Infoprint Server. Each IP PrintWay printer should be defined in a printer definition in the Printer Inventory.

Buttons on left side of Work with Printers panel

The meaning of the buttons on the left side of the panel in the navigation bar, from top to bottom, are as follows:

► Work with print jobs
► Work with printers
► Work with NetSpool logical units (LUs)
► Find printer definitions
► Check system status
► Help

Figure 5-14   Work with printers panel - primary panel

Selecting options on this panel

Select whether you want to work with IP PrintWay printers, PSF printers, or both types of printers. Then enter one or more values to limit the number of printers displayed, as follows:

- ► You can select by printer name, location, hostname or IP address, or queue or port by typing the information in the field.
- ► If you want to see all printers that start with the letter p, simply type p in the Printer name field, as shown in Figure 5-14 on page 103.
- ► Then, press **Find** to display the next panel, which is shown in Figure 5-15 on page 105.

5.5.1 Working with printers

The Work with Printers panel lets you select the printers you want to work with. This panel lists IP PrintWay printers that you are authorized to see. The panel lets you work with several printers at the same time, and to link to more detailed information about one printer. To work with printers, you can do any of the following:

- ► Select the boxes next to the printers that you want to work with. To work with all printers in the list, select All.
- ► Select an action button.
- ► To view any error messages, select (Error).
- ► To view any information messages, select (Information).

Detailed printer information about a printer and do additional actions

Select the value in the Name or Printer host name or IP address field for the printer. On the IP PrintWay Printer Information panel, you can see more information about the printer and perform these additional actions: Ping, Redirect, and View log.

The print queue for a printer

Select the value in the Active job count field for the printer.

To see extended status information for a printer

Select the Web page icon in the Status field for the printer, which is shown in Figure 5-15 on page 105. This opens a new browser window with the URL set to the IP address of the printer.(Not all printers have a Web page.) Also, if the printer is controlled by a print server, Infoprint Central cannot display the printer's Web page.

Using the buttons

There are two buttons for the printer, Start and Stop, as shown in Figure 5-15 on page 105 and explained here:

Start   This starts the selected printers. The printers begin processing print jobs.

Results: You see an information or error message. If the message is not automatically displayed, select the Informational Messages icon to view the messages.

If the action was successful, the status of the printers changes to either Idle or Processing.

Stop   Stops the selected printers so that IP PrintWay does not process any more print jobs for the printer. However, data that IP PrintWay has already transmitted to a printer and is already in the printer's buffer continues to print. Infoprint Server and JES continue to accept print requests for stopped printers and add print jobs to the printers' queues.

On the Stop Printer panel, you can select whether to stop the printer immediately or wait until the current print job completes printing. If you stop the printer immediately, the current print job is deleted.
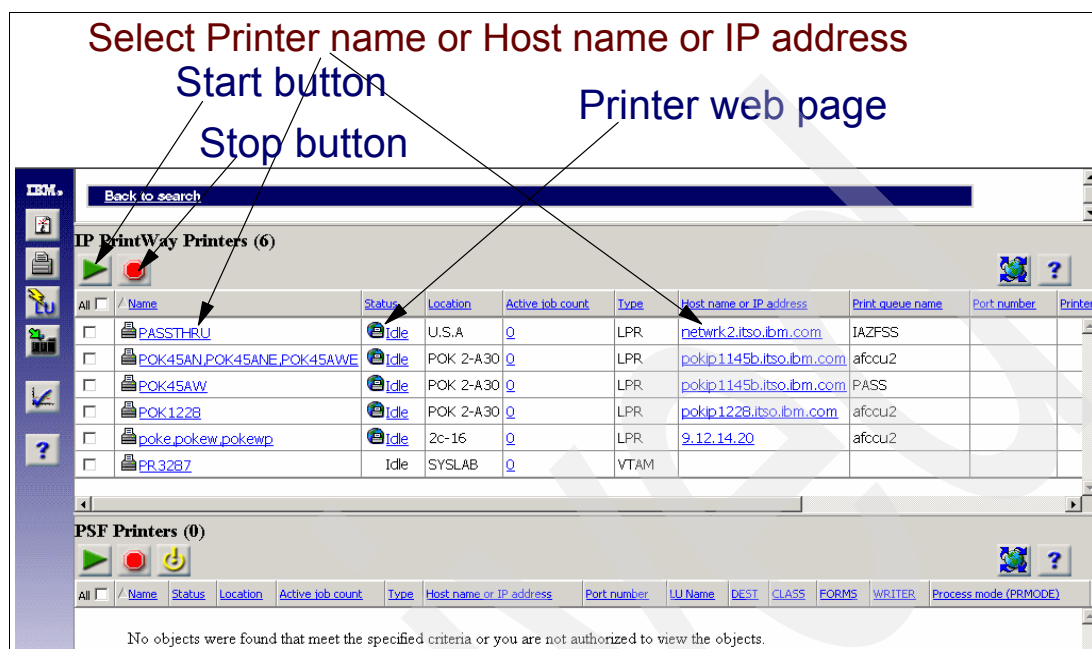
Figure 5-15   IP PrintWay printers display from working with Find printers button

> **Attention:** To stop a printer immediately, but without deleting the current print job, follow these steps:
>
> 1. On the Stop Printer panel, select Complete the current print job and then select OK.
> 2. On the IP PrintWay Printer Information panel, expand the Print Job Queue section.
> 3. On the Infoprint Server Print Jobs panel, hold the print job that is processing.
>
> If a printer is not working, you can redirect all print jobs to an alternate IP PrintWay printer after you stop it. To redirect a printer, select (Redirect).
>
> To restart a stopped printer, select (Start).
>
> If IP PrintWay is restarted, all stopped printers are automatically restarted.

5.5.2 IP PrintWay Information panel

The panel shown in Figure 5-16 on page 107 is a result of selecting a printer shown in Figure 5-15. This IP PrintWay printer panel lets you work with the selected printer and see detailed information about it.

Working with a printer action button

You can select one of the five action buttons, shown in Figure 5-16 on page 107. When the action completes, you see an error message or an information message.

Redirection information   The printer where this printer is redirected, or other printers that are redirected to this printer. You see this section only when redirections are in effect for this printer. When IP PrintWay is restarted, all redirections that are in effect are restored.

To redirect the printer to a different printer, select the value in the Name field. On the IP PrintWay Printer Information panel, select (Redirect).

To remove the redirection that is in effect, select the value in the Name field. On the IP PrintWay Printer Information panel, select (Restore).

When IP PrintWay is restarted, all redirections that are in effect are restored.

Detailed information about the printer

To view detailed information about the printer, expand all sections by selecting (Expand all) at the top of the panel. Or to expand one or more of the following sections, press an Expand button.

Properties   These are the basic properties of the printer.

Print Job Queue   These are print jobs that were submitted to this printer. This queue contains active jobs, including print jobs that are being processed, jobs are waiting to be processed, or jobs that are held. It also includes retained print jobs, which are print jobs that already completed but are retained for a period of time. Retained jobs are automatically deleted when the retention period expires. The print jobs will print in the order displayed.

If someone redirected this printer to another printer, you do not see active print jobs submitted to this printer because these print jobs are on the queue of the alternate printer. However, you can see print jobs that Infoprint Server retained before you redirected the printer. If you select (Release) to print retained print jobs, the print jobs print on the alternate printer. After you restore the printer, print jobs that were retained on the alternate printer remain on that printer's queue.

Printer Definitions   These are the printer definitions in the Printer Inventory for this printer. You see this section only when at least one printer definition exists for the printer.

Printer's Web Page   This is a link to the printer's Web page, which contains extended status information. Infoprint Central opens a new browser window with the URL set to the IP address of the printer. Not all printers have a Web page. Also, if the printer is controlled by a print server, Infoprint Central cannot display the printer's Web page. You see this section only when IP PrintWay uses either the LPR or direct sockets transmission protocol to send print jobs to the printer.
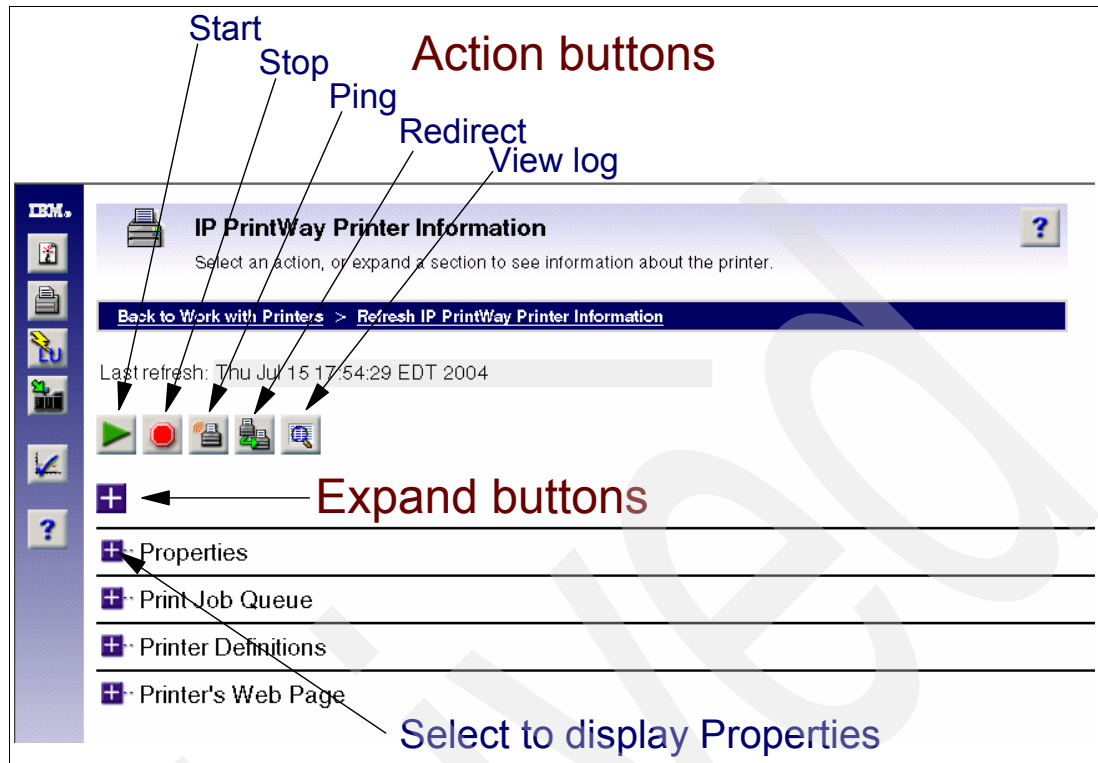
Figure 5-16   IP PrintWay printer information window

5.5.3 Ping a printer

When you select the Ping action button shown in Figure 5-16, then Figure 5-17 on page 108 shows the window that is displayed. The Response field displays the responses received from these commands:

Ping   This tests the TCP/IP network connection to a remote printer or print server.

Success means the TCP/IP network is working and the z/OS system can communicate with the printer. If you ping a printer instead of a print server, a successful response also means the printer is turned on. However, the printer might be offline.

Failure means the printer did not respond in 1 second. This can occur if the network is not working, the printer is not turned on, or the remote host is slow to respond.

LPQ   This provides information about jobs on the LPD's print queue. The information provided depends on the printer's implementation of the LPD. You can see a response from this command only for IP PrintWay printers that use the LPR to LPD protocol to communicate with the printer.

Success means the LPD in the printer or print server is running. However, the printer might be offline.

Failure means the TCP/IP network connection to the printer or print server is not working, the printer does not contain an LPD, or the LPD is not running.

Ping considerations
If the `ping` command is unsuccessful, consider the following:

► Select the Ping action button again to see if the problem persists.

- Make sure the printer is turned on.
- Make sure the value in the Printer host name or the IP address field on the Printer Information panel is correct. If the value in this field is not correct, ask your administrator to change the value in the Printer Inventory.

If the `ping` command is successful but print jobs are not printing, make sure the printer is online.

If the `ping` command is successful but print jobs are not printing on the expected printer, the printer's IP address might be a duplicate of another IP address in the system. To see if this is the case:

- Turn off the printer. For a PSF printer, also turn off the IPDS LAN attachment (such as the i-data 7913 IPDS Printer LAN Attachment) if one exists.
- Wait at least five minutes for the system to clear the TCP/IP Address Resolution Protocol (ARP) tables.
- Select the Ping action button again.
- If the `ping` command is still successful, a duplicate IP address exists.

LPQ considerations

If the `LPQ` command is successful and the response from the `LPQ` command indicates that the print queue does not exist, make sure the value in the Queue field on the Printer Information panel is correct. The print queue name is case-sensitive so be sure the correct uppercase and lowercase letters are used. If the value in this field is not correct, ask your administrator to change the value in the Printer Inventory.
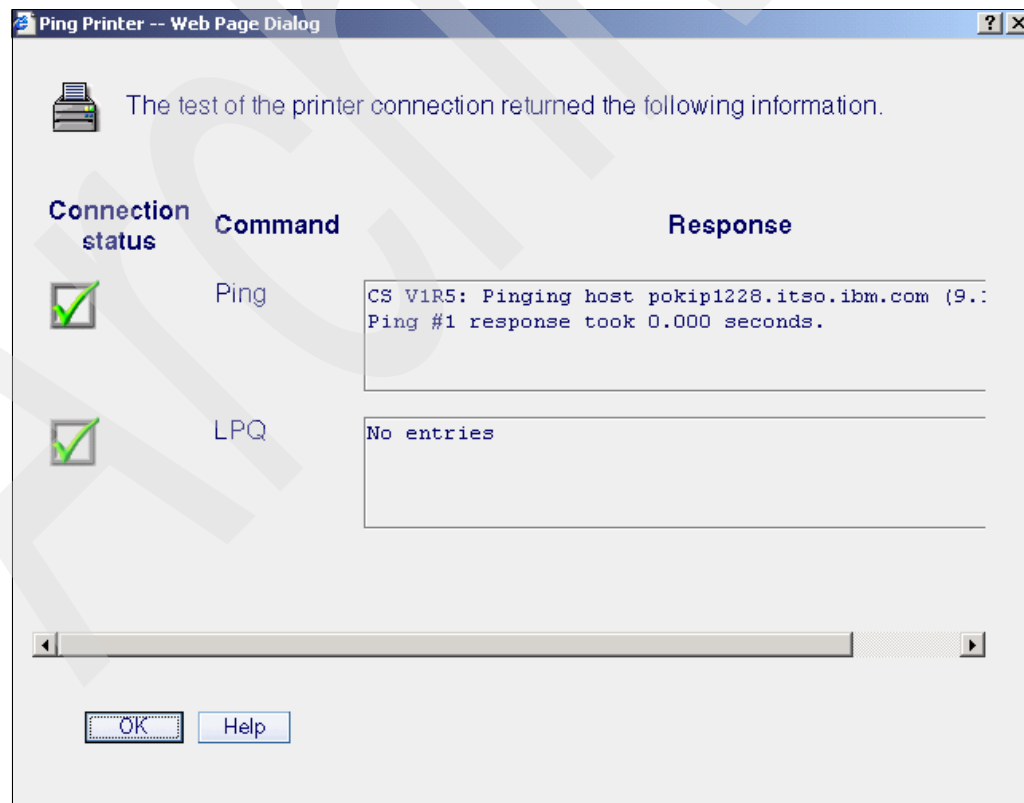
Figure 5-17   Ping a printer window

5.5.4 Redirect a printer

To see the panel shown in Figure 5-18 on page 110, select the Redirect action button shown in Figure 5-16 on page 107. The Redirect IP PrintWay Printer panel lets you move all print jobs currently on the queue of the selected IP PrintWay printer and all print jobs that are subsequently submitted to this printer to an alternate IP PrintWay printer. When you select the alternate printer, consider the following:

► The alternate printer must be an IP PrintWay printer.

► If a printer definition does not exist for the alternate printer in the Printer Inventory, the printer must support either the LPR or direct-sockets printing protocol.

► The alternate printer must not itself be redirected to an alternate printer.

► The alternate printer should be able to print the same types of data streams (for example, PostScript or PCL) as the original printer so that data prints correctly.

Printer selected for redirect

To specify the printer where you want to redirect all print jobs, select how you want to specify the alternate printer, as follows:

Printer definition Enter the name of the printer definition for the alternate printer. IP PrintWay redirects print jobs to the printer address specified in this printer definition. However, IP PrintWay continues to use attributes in the printer definition for the original printer to format data.

Host name or IP address Enter either the host name or dotted-decimal IP address of the alternate printer.

Redirect considerations

To list printer definitions, select **Find printer definitions** from the navigation bar.

Select **Host name or IP address** if no printer definition exists for the printer.

► If you select **Host name or IP address**, enter either the print queue name or the port number of the alternate printer. Then select either Queue or Port to identify the type of value you entered. Then select **OK**.
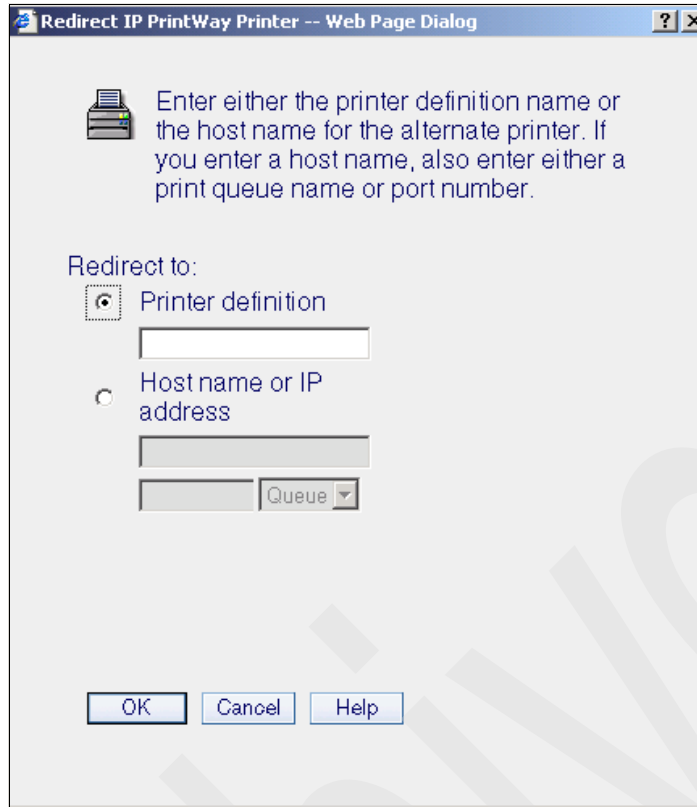
Figure 5-18   Redirect IP PrintWay Printer panel

5.5.5 Using the stop button

You can start and stop IP PrintWay and PSF printers. When you stop a printer, you can select whether the print job that is currently processing is to be completed or deleted. You might want to stop a printer that is not working. You might need to restart PSF printers after the z/OS system is IPLed. Printers might be started and stopped automatically in the following situations:

► When the operator restarts IP PrintWay, stopped printers are automatically restarted.

► When the operator cancels the PSF functional subsystem (FSS), printers that the FSS controls are automatically stopped.

► When the z/OS system is IPLed, any IP PrintWay printers that you had stopped are restarted. If IP PrintWay printers are not working after the IPL, make sure that the IP PrintWay daemons are started on the System Status panel.

► When the z/OS system is reIPLed, all PSF printers are stopped unless your administrator defined them to JES with the automatic start option.

To stop printers:

► Select (Work with printers) from the navigation bar.

► On the Work with Printers panel, enter search values to find the printer.

► On the IP PrintWay Printers or PSF Printers panel, select the box next to the printer and select Stop to stop the printer. You can stop more than one printer at the same time.

Options to stop printers

When you Select the stop action button shown in the Figure 5-19, the Stop Printer - Web Page Dialog panel appears on the window and lets you stop a printer. Select the action to do for any print jobs that are being processed on that printer.

To select the action to do for the current print job, Select one of these options:

► **Complete the current print job**: The current print job finishes.

► **Delete the current print job:** The current print job is deleted from the JES spool.

► Select **OK**.
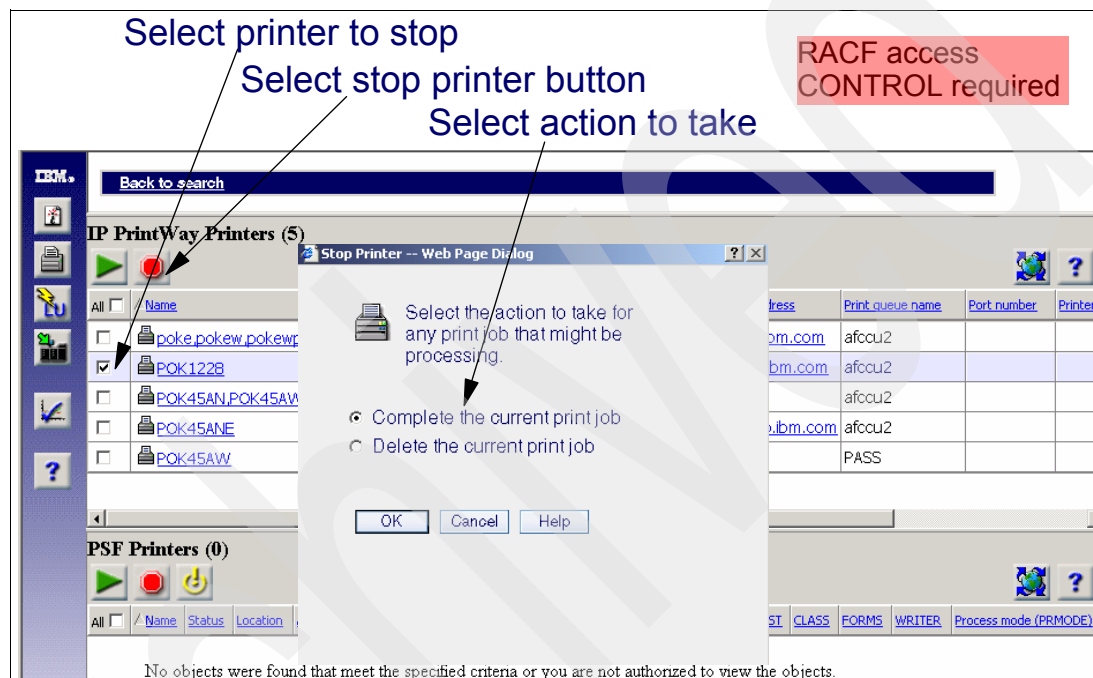
Figure 5-19   Stopping a printer options

5.5.6 Work with Print Jobs panel

The Work with Print Jobs panel lets you select the print jobs you want to work with. You can work with any print jobs that are currently on the JES spool. You can also see information about any Infoprint Server print jobs that have already finished processing.

Finding print jobs

Select the type of print jobs to display. Select either **Infoprint Server print jobs** or **JES print jobs**. The type you choose determines which print jobs are displayed, how much information you see about the print jobs, and which actions you can do on print jobs. The type you choose also changes which search fields are available on this panel.

Infoprint Server print jobs

Select **Infoprint Server print jobs**. This option lets you:

► See more information about Infoprint Server print jobs, such as more detailed status.

► Perform more actions on Infoprint Server print jobs, such as move a print job to another printer.

- See information, including messages, for Infoprint Server print jobs that have finished processing and are no longer on the JES spool.
- Search for print jobs using search values known only to Infoprint Server, such as the Windows logon name of the job submitter.

In Figure 5-20 on page 113l, the selection is for Job ID and because all print jobs have a Job ID starting with PS, this selects all of those jobs.

JES print jobs

If the print job is not found, select **JES print jobs**. This option lets you:

- Work with print jobs that Infoprint Server does not process, such as print jobs submitted directly to a PSF-controlled printer using JCL.

- Work with print jobs that Infoprint Server has not received due to an error in job submission. For example, job submitters might fail to specify the correct CLASS value on their DD or OUTPUT JCL statements, so IP PrintWay does not select the print jobs from the JES spool.

Find print job option 2

A separate option could be to enter a value in the Submitted within field to limit the number of jobs found. Do not enter a value if you want to find all possible print jobs. Use this field as follows:

- Enter a value in at least one of the search fields. If you enter values in more than one field, only print jobs that match all values are displayed.
    - Do *not* enter an asterisk (*) or a question mark (?) as a wildcard symbol.
    - If you enter only the first characters of a value in a search field instead of the full value, clear Show only exact matches.
    - If you do not know the correct uppercase and lowercase letters for case-sensitive fields, then selecting Clear shows only exact matches.

Save button

Select **Save** to save these search values. The saved search values are displayed the next time you use this panel when you select the **Find** button.
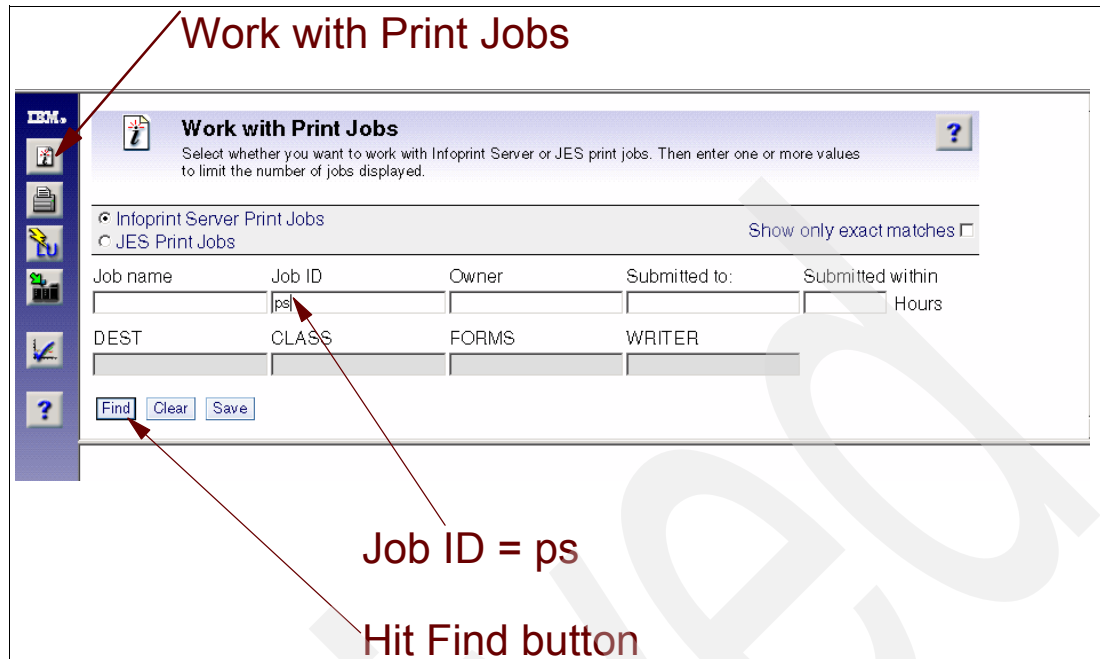
Figure 5-20   Infoprint Central Work with Print Jobs

5.5.7 Infoprint Server print jobs

Figure 5-21 on page 114 lists Infoprint Server print jobs that you are authorized to see. This panel lets you work with several print jobs at the same time. You can also link to more detailed information about one print job and to related objects.

Working with print jobs

Select the boxes next to the print jobs that you want to work with. To work with all print jobs in the list, select All. You can select an action button to do one of the following:

► To view any error messages, select (Error).

► To view any information messages, select (Information).

Detailed information about a print job

Select the value in the Job ID field for the print job. On the Infoprint Server Print Job Information panel that is displayed, which is shown in Figure 5-22 on page 115, you can see more information about the print job and do these additional actions:

► Change priority
► Move
► View properties
► View log

Additional actions

To see information about the printer where the print job is to print or has printed, and to work with that printer, select (IP PrintWay printer) in the Printer field for the print job. This field is blank if the printer is not an IP PrintWay printer or if IP PrintWay has not yet received the print job.

To see the printer definition used to format a print job, select the value in the Printer definition field for the print job.
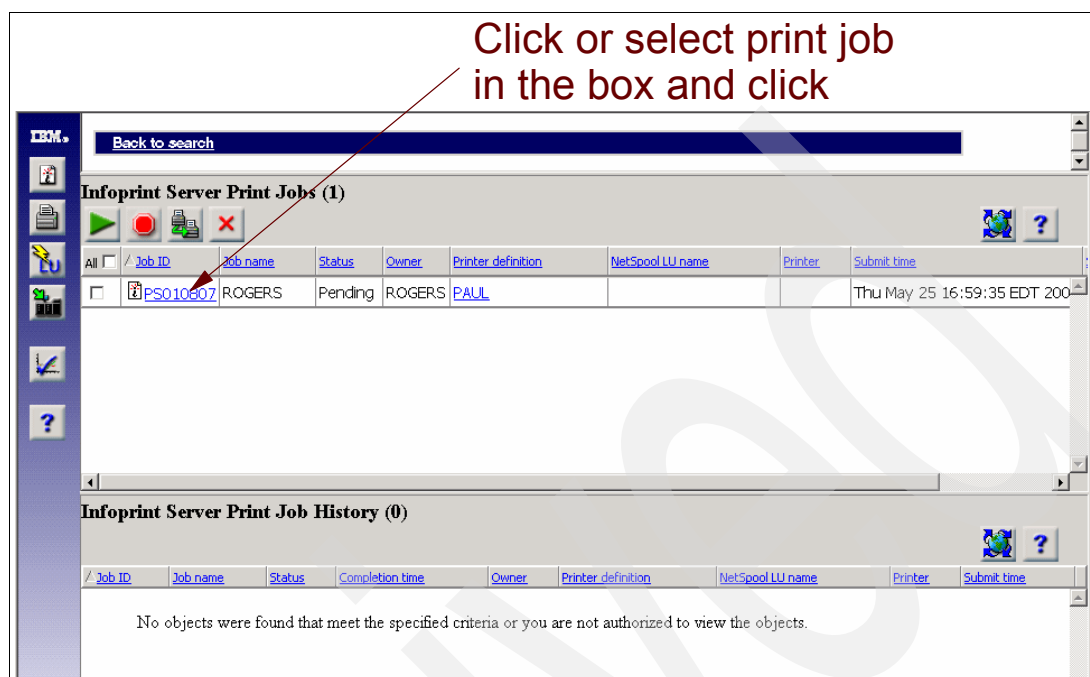
Figure 5-21   Infoprint Server job selected

5.5.8 Print job information

Figure 5-22 on page 115 displays information about an Infoprint Server print job. This panel lets you work with the print job and to see detailed information about the print job. To work with a print job, select an action button. When the action completes, you see an error message or an information message. To see detailed information, select (Expand) to expand one of these sections:

► **Properties:** The basic properties of the print job. To see all properties and change some of them, select (View properties).

► **Documents:** The documents in the print job.

► **Printer:** The IP PrintWay printer where the print job prints. You see this section only if the print job is on the queue of an IP PrintWay printer. The printer is not displayed if the printer is not currently printing and no printer definition exists for the printer.

► **Printer Definition:** The printer definition used to process the print job.

► **NetSpool LU:** The NetSpool logical unit (LU) that received print data from a VTAM application and created the print job. You see this section only if the print request was submitted from a VTAM application (such as CICS and IMS).

Change print output priority

To change the print job priority, select the Change priority button.

Figure 5-22 on page 115 displays information about an Infoprint Server print job. This panel lets you work with the print job and to see detailed information about the print job. To work with a print job, select an action button. When the action completes, you see an error message or an information message.

To see detailed information, select (Expand) to expand one of these sections:

► **Properties:** The basic properties of the print job. To see all properties and change some of them, select (View properties).

► **Documents:** The documents in the print job.

► **Printer:** The IP PrintWay printer where the print job prints. You see this section only if the print job is on the queue of an IP PrintWay printer. The printer is not displayed if the printer is not currently printing and no printer definition exists for the printer.

► **Printer Definition:** The printer definition used to process the print job.

► **NetSpool LU:** The NetSpool logical unit (LU) that received print data from a VTAM application and created the print job. You see this section only if the print request was submitted from a VTAM application (such as CICS and IMS).

Change print output priority

To change the print job priority, Select the Change priority button.

Figure 5-22   Infoprint Server Print Job Information panel

5.5.9 Change print output priority

Figure 5-23 on page 116 lets you change the priority of a print job. The priority can affect how soon the print job will print.

To specify a new priority for the print job, do the following:

► Enter the new priority in the Priority field.

► Select OK.

Print output priority

The priority of print output has a range between 0 and 255. This initial priority of the print output is the priority of the submitter, which is normally between 0 and 15.

❏ This panel appears on top of the Print Job Information
  ➤ The current priority of the print output is 15
  ➤ Overtype that to specify the new priority
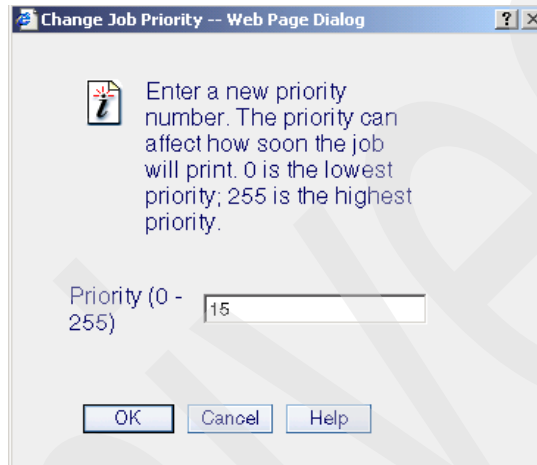
Figure 5-23   Panel to change print output priority

6

Messages and diagnosis

When data is not processed as expected (for example, output does not format as expected; separator pages do not print as expected; or printer definitions cannot be accessed), it might not always be clear which components of Infoprint Server are involved. Finding the source of the problem usually requires figuring out which component of Infoprint Server to address.

This chapter describes the diagnostic tools you can use to collect information about Infoprint Server software problems. The information you collect may be of assistance when you communicate with IBM Support Center representatives as they work to isolate the source of a problem in a Infoprint Server component.

The chapter explains the following steps used to investigate and analyze a problem:

► Performing problem determination
► Determining system problem indications
► Analyzing logs and error information
► Looking at dumps and traces

117

6.1 Problems with the Web server

If you encounter Web server problems using Infoprint Central from the browser, the error messages appear in a file system file. As an example, Figure 6-1 shows an example of an error message related to the Web server.

The HTTP configuration file contains the following default statement.

```
ErrorLog /usr/lpp/internet/server_root/logs/httpd-error
```

Replace this statement with the following statements. In this example, there is an zFS file system that contains all the Web server files. The directory path name used in the examples is /web/printway. Each installation should choose a path name that is useful.

```
AccessLog      /web/printway/logs/httpd-log
AgentLog       /web/printway/logs/agent-log
RefererLog     /web/printway/logs/referer-log
ErrorLog       /web/printway/logs/httpd-errors
CgiErrorLog    /web/printway/logs/cgi-error
```

Use these directives to specify the path and file name where you want the server to log internal errors. The server starts a new log file each day at midnight if it is running. Otherwise, the server starts a new log file the first time you start it on a given day.

When creating the file, the server uses the file name you specify and appends a date suffix. The date suffix is in the format Mmmddyyyy, where Mmm is the first three letters of the month; dd is the day of the month; and yyyy is the year.
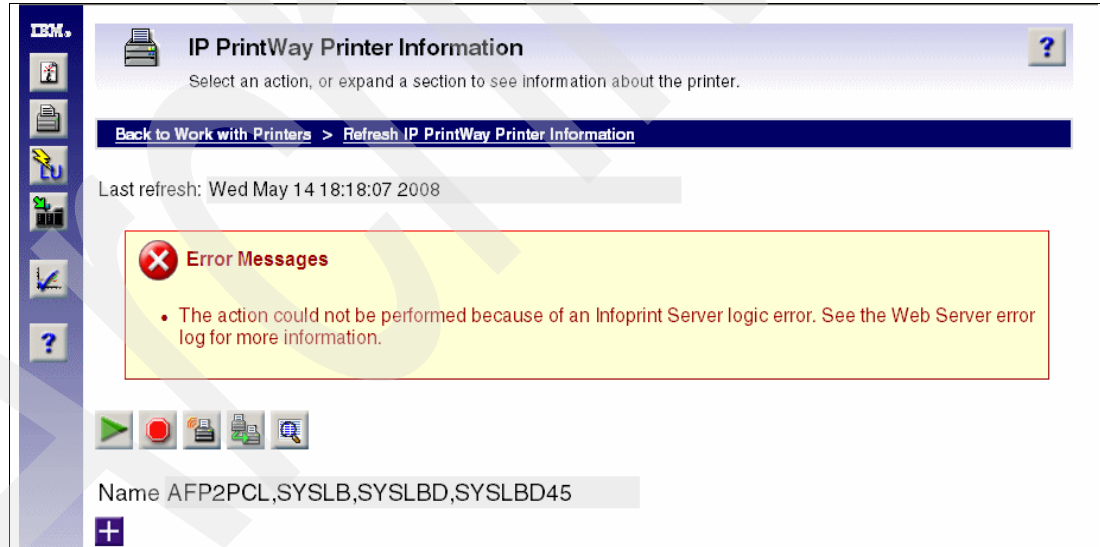
Figure 6-1   Infoprint Central panel display with a Web server error

Find error logs

To find the error messages, go to the ISHELL. Enter the path name used by your system for these files; here is an example:

```
/web/printway/logs/
```

Figure 6-2 on page 119 shows the error log files where you can see the messages related to the Web server errors. To view the error messages, type b (for Browse) next to the file.

```
 File  Directory  Special_file  Commands  Help
 --------------------------------------------------------------------------------
 Directory List
  Command ===> _____

  Select one or more files with / or action codes.  If / is used also select an
  action from the action bar otherwise your default action will be used.  Select
  with S to use your default action.  Cursor select can also be used for quick
  navigation.  See help for details.
  EUID=0    /web/printway/logs/
    Type  Perm  Changed-EST5EDT    Owner       ------Size  Filename   Row 1 of 12
  _ Dir   755   2008-05-15 08:06   HAIMO          319488  .
  _ Dir   755   2007-05-08 20:35   HAIMO            8192  ..
  _ File  644   2008-05-14 18:33   HAIMO           52190  agent-log.May142008
  _ File  644   2008-05-15 09:48   HAIMO            4686  agent-log.May152008
  _ File  644   2008-05-14 16:07   HAIMO               0  cgi-error.May142008
  _ File  644   2008-05-15 00:00   HAIMO               0  cgi-error.May152008
  _ File  644   2008-05-14 16:34   HAIMO            4864  httpd-errors.May142008
  _ File  644   2008-05-15 09:48   HAIMO             559  httpd-errors.May152008
  _ File  644   2008-05-14 18:33   HAIMO           53593  httpd-log.May142008
  _ File  644   2008-05-15 09:48   HAIMO            4599  httpd-log.May152008
  _ File  644   2008-05-14 18:33   HAIMO           55512  referer-log.May142008
  _ File  644   2008-05-15 09:48   HAIMO            3497  referer-log.May152008
```

Figure 6-2   The /web/printway/logs/ display of the error files

6.1.1 Web server tracing

For problems associated with the HTTP Web server, you can turn on the tracing options. The level of tracing provided is:

-v trace	First level
-vv trace	Second level
-mtv	Third level
-debug	For maximum tracing
-vc	To trace caching

SYS1.SAMPLIB(IMWEBSRV) contains the default HTTP server procedure that has statements you can specify in the procedure, as displayed in Figure 6-3 on page 120. The procedure used in the examples is shown in Figure 5-3 on page 82. For Web server tracing, you can activate these options by removing the commented statements.

It is recommended that you turn on tracing only if instructed to do so by IBM support personnel. IBM support personnel can provide guidance about the most appropriate trace for your problem. To turn off tracing, use the **-nodebug** option.

The **-v**, **-vv**, and **-mtv** flags represent a progression of increasing trace verbosity. They do not need to be used in combination with each other. If more than one of these flags is set, the first flag encountered sets the initial verbosity; all other flags are ignored.

The **-v**, or Verbose, option turns on first level tracing to stderr. Verbose tracing provides basic tracing information about all requests, without significantly impacting Web server performance. The design of the fields supports automatic parsing of the information. The trace output is written into the SYSOUT DD statement in the HTTP procedure.

The **vv**, or Very Verbose, option turns on second level tracing to stderr. The **-mtv**, or Much Too Verbose, option turns on third level tracing to stderr.

```
//*  HTTP Server Parameters:
//*   -SN                      # WLM - subsystem name
//*   -AE                      # WLM - Application Envirnonment
//*   -fscp     nnn            # File system codepage - EBCDIC
//*   -netcp    nnn            # net code page       - ASCII
//*
//*   -gc_only                 # clean cache & exit (garbage collect)
//*   -normalmode
//*   -p        nnnn           # use port nnn (default 80)
//*   -sslmode
//*   -sslport  nnnn           # use port nnn (default 443)
//*   -nosec                   # no security
//*   -nosmf                   # no smf processing on
//*   -smf                     # smf processing on
//*   -r        /etc/httpd.conf # use rule file xxxx
//*   -restart
//*   -v                       # trace to stderr
//*   -vv                      # trace all to stderr
//*   -vc                      # cache trace to stderr
//*   -version                 # show version and exit
//*   xxxxxxx                  # ServerRoot xxxxxxx; Pass /*
```

Figure 6-3 HTTP optional parameters in the HTTP procedure

6.2 Messages in Infoprint Server

If an error message is displayed, the message prefix identifies which component sent the message. A displayed or printed message can appear by itself or with other information, such as a time stamp. The first three or four characters of a messages usually identify the component that issued this message.

Infoprint Server components use the following message prefixes:

ANFM   IP Printway basic mode

AOP   Print Interface and IP Printway extended mode

API   NetSpool

AOX   Infoprint Server Transforms

In an environment like Infoprint Server it is also possible that the message is written to the printer, because that is the place where a user might look first.

6.3 Infoprint Server common message log

The Infoprint Server common message log contains messages from all components of Infoprint Server except for IP PrintWay basic mode and Infoprint Server Transforms. If you want non-console messages that are written only to the Infoprint Server common message log to be sent to the hardcopy log, you can enable the hardcopy log function. That is, the Infoprint Server message configuration file, aopmsg.conf, lets you customize message

processing. The hardcopy log is either the system log (SYSLOG) or the operations log (OPERLOG), depending on how you configured the hardcopy medium in the HARDCOPY statement in the CONSOLxx Parmlib member.

Save messages in the common message log on a regular basis so that you do not lose messages that you might need to diagnose a problem. Infoprint Server automatically deletes messages from the common message log after the retention time expires. The retention time is specified in the log-retention attribute in the Infoprint Server configuration file, aopd.conf.

You can use the Infoprint Server `aoplogu` command to save messages in the common message log to an HFS or zFS file. The `aoplogu` command does not let you save messages to an MVS data set. To use the `aoplogu` command, you must be a member of the AOPADMIN group.

The Infoprint Server message log is the common place where you should look first for messages. However, be aware that Infoprint Server automatically deletes messages from the common message log after the retention time expires. The retention time is specified in the log-retention attribute in the Infoprint Server configuration file (aopd.conf). To see messages from IP PrintWay extended mode, specify a value greater than zero (0) in this attribute.

Messages are divided into two categories: current and historical. After the job is removed from the system, all messages belonging to this job are moved from current log to the historical log. Depending on the retention period, you can review any jobs that were processed by infoprint Server.

6.3.1 Common message log

The common message log allows you to see messages from most Infoprint Server components in one place. Also, the log contains error messages from Infoprint transforms that fail. If a transform completes successfully, messages related to problems in the input data stream are written at the end of the output, instead of to the common message log.

IP PrintWay extended mode writes its messages only to the common message log. Other components, such as NetSpool and Print Interface, write their messages to the common message log (as shown in Figure 6-4 on page 122), and also to other locations such as the NetSpool message-log data set and the system console log.

An administrator must customize the common message log to specify how many days of messages to keep. The default is that no messages are kept in the common message log.
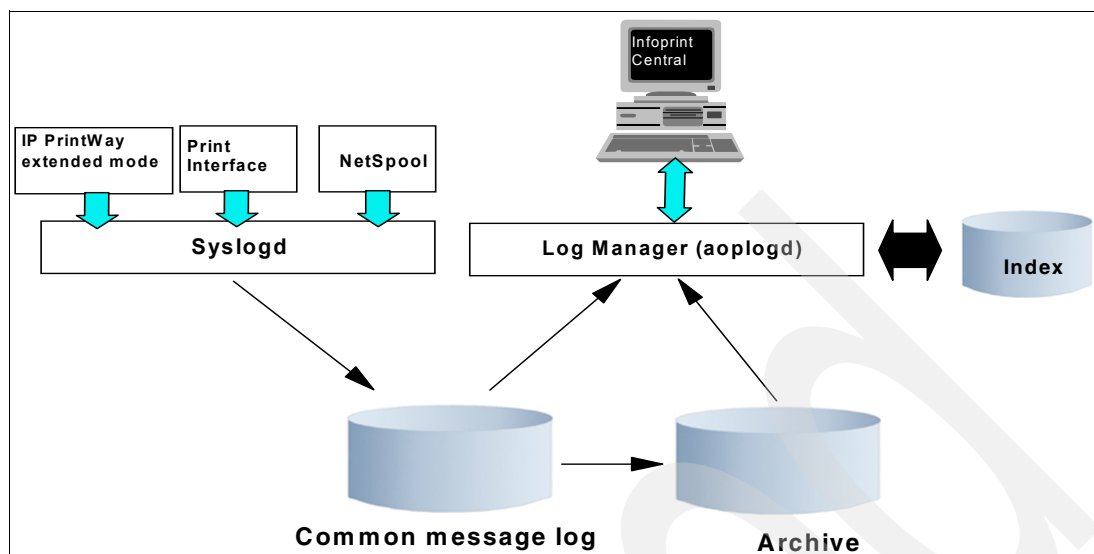
Figure 6-4   Infoprint Server common log manager

6.3.2 Browsing the common message log

You can view and process messages in the common message log in the following ways:

- ► Authorized Infoprint Central users can view messages for selected print jobs and IP PrintWay printers. See "View messages with Infoprint Central" on page 129 for more information about this topic.

- ► Infoprint Server administrators can use the **aoplogu** command to select messages in a particular time range and copy them to a file or view them on the terminal.

- ► Infoprint Server administrators can send all or selected messages to the z/OS system log (SYSLOG) or operations log (OPERLOG) for message automation.

To view messages, there is a simple way to browse the log:

- ► On the ISPF command panel, type `ISHELL` followed by the directory specified in the base-directory attribute in the Infoprint Server configuration file (aopd.conf).

- ► The subdirectory for common log is logs, as shown in Figure 6-5 on page 123. Add them to the base-directory attribute.

```
   File   Directory   Special_file   Tools   File_systems   Options   Setup   Help
 ──────────────────────────────────────────────────────────────────────────────────
                          UNIX System Services ISPF Shell
 Command ===> _____

 Enter a pathname and do one of these:

     - Press Enter.
     - Select an action bar choice.
     - Specify an action code or command on the command line.

 Return to this panel to work with a different pathname.
                                                                    More:      +
     /var/Printsrv/logs_____
     _____
     _____
     _____


 EUID=0
```

Figure 6-5   UNIX System Service ISPF shell panel

▶ Press Enter and type b (for Browse) next to the log file you want to see, as shown in Figure 6-6.

```
   File   Directory   Special_file   Commands   Help
 ──────────────────────────────────────────────────────────────────────────────────
                               Directory List
 Command ===> _____

 Select one or more files with / or action codes.  If / is used also select an
 action from the action bar otherwise your default action will be used.  Select
 with S to use your default action.  Cursor select can also be used for quick
 navigation.  See help for details.
 EUID=0   /SC65/var/Printsrv/logs/
   Type  Perm  Changed-EST5EDT,  Owner       ------Size  Filename     Row 1 of 3
 _ Dir    750  2008-03-13 15:50  HAIMO            8192  .
 _ Dir    771  2008-03-11 15:56  HAIMO            8192  ..
 b File   666  2008-03-11 15:56  HAIMO           17367  1205265372
```

Figure 6-6   Infoprint Server log files

▶ You will be shown all messages in the Infoprint Server common message log; see Figure 6-7 on page 124.

```
     Menu   Utilities   Compilers   Help

 BROWSE      /SC65/var/Printsrv/logs/1205265372         Line 00000000 Col 001 080
 Command ===> _____ Scroll ===> CSR
********************************* Top of Data **********************************
1205265372 priority:info user:AOPSTC program:aopd msg:AOP075I Daemon aoplogd was
1205265374 priority:info user:AOPSTC program:aopd msg:AOP075I Daemon aopsdbd was
1205265374 priority:info user:AOPSTC program:aopd msg:AOP075I Daemon aophinvd wa
1205265375 priority:info user:AOPSTC program:aopd msg:AOP075I Daemon aopxfd was
1205265375 priority:info user:AOPSTC program:aopd msg:AOP075I Daemon aoplpd was
1205265378 priority:info user:AOPSTC program:aopd msg:AOP075I Daemon aopippdxp w
1205265379 priority:info user:AOPSTC program:aopsubd msg:AOPS002I Subsystem esta
1205265379 priority:info user:AOPSTC program:aopd msg:AOP075I Daemon aopsubd was
1205265379 priority:info user:AOPSTC program:aopd msg:AOP075I Daemon aopnetd was
1205265379 priority:info user:AOPSTC program:aopd msg:AOP075I Daemon aopssid was
1205265379 priority:info user:AOPSTC program:aopwsmd msg:AOP3210I The IP PrintWa
1205265379 priority:error user:AOPSTC job:JOB18338 dsn:VAINI.XMLXFRM.JOB18338.D0
1205265379 priority:error user:AOPSTC job:JOB18339 dsn:VAINI.XMLXFRM.JOB18339.D0
1205265379 priority:error user:AOPSTC job:JOB18341 dsn:VAINI.XMLXFRM.JOB18341.D0
1205265379 priority:error user:AOPSTC job:JOB18342 dsn:VAINI.XMLXFRM.JOB18342.D0
1205265379 priority:error user:AOPSTC job:JOB18353 dsn:VAIN.XMLXFRM.JOB18353.D00
1205265379 priority:error user:AOPSTC job:JOB18788 dsn:VAINI.XMLXFRM.JOB18788.D0
1205265379 priority:info user:AOPSTC job_selection_rule:COAX program:aopwsmd msg
1205265379 priority:info user:AOPSTC job_selection_rule:FSHIFT program:aopwsmd m
1205265379 priority:info user:AOPSTC job_selection_rule:SAPI program:aopwsmd msg
```

Figure 6-7   Infoprint Server common message log

Note that this is not the recommended way to view messages, because the messages are unformatted. However, because the message log is a flat file, the log can be processed with UNIX scripts, REXX programs, or ISPF macros.

6.3.3 Using the aoplogu command

The `aoplogu` command lets administrators view messages in the common message log. This utility transforms messages into a more readable form.You can specify that you want to view:

► All messages

► Messages in a range of time (for example, messages from 1 May 2007 to 31 May 2007, or messages beginning on 6 May 2007)

► The most recent messages for a length of time (for example, messages for the last day or for the last two minutes)

The `aoplogu` command returns messages in this format:

```
date time priority:level user:id [job:id] [filename:name] [dsn:name]
[output_device:name] [job_selection_rule:name] [fsa:name] [luname:name]
[jes_jobname:name] [program:name] msg:message
```

For example:

```
05/29/07 13:48:42 (UTC-5) priority:info user:KGOE job:PS011433
filename:(standard_input) dsn:KGOE.KGOE.JOB15968.D000000A.D#INPUT# program:lp
msg:AOP119I Job 11433 document (standard input) completed spooling with status
"pending".
```

Important: The Universal Time Coordinated (UTC), as a universal reference, is used for time stamps in the common message log. The TZ environment variable maps that reference time to the local time specified with the variable.

You must run the `aoplogu` command in a UNIX System Service environment.

However, you can use the aoplogu utility as a batch job from TSO by using the AOPBATCH program. With AOPBATCH, you can set up the z/OS UNIX environment. Figure 6-9 shows an example of how to use **aoplogu** by using AOPBATCH to look for messages in the last three days.

```
KGOE @ SC65:/u/kgoe>aoplogu -l 1:00:00
05/30/07 14:33:52 (UTC-5) priority:info user:AOPSTC program:aopstop msg:AOP079I
A shutdown of daemon aopxfd has been initiated.
05/30/07 14:33:52 (UTC-5) priority:info user:AOPSTC program:aopxfd msg:AOP044I
Shutdown complete.
05/30/07 14:34:03 (UTC-5) priority:info user:AOPSTC program:aopd msg:AOP075I
Daemon aopxfd was started successfully.
KGOE @ SC65:/u/kgoe>


  ===>
```

Figure 6-8   aoplogu in the UNIX System Service environment

Format of aoplogu command

The command has the following format:

```
aoplogu [-b time] [-e time] or aoplogu -l time
```

The format of time can be one of these:

```
year:month:day:hour:minute
month:day:hour:minute
day:hour:minute
hour:minute
minute
```

The options are:

-b   The beginning time of the range of messages that you want to view. The default is the oldest message that is available in the common message log.

-e   The ending time of the range of messages that you want to view. The default is the most recent message that is available in the common message log.

-l   The most recent messages for the length of time that you specify.

```
//KGOE#LOG JOB    (ITSO),'KLAUS GOETZE',TIME=100,NOTIFY=&SYSUID
//LOG     EXEC PGM=AOPBATCH,
// PARM='/aoplogu -l 3:00:00'
//STDOUT  DD  SYSOUT=*
//STDERR  DD  SYSOUT=*
//STDENV  DD  *
TZ=EST5EDT
/*
```

Figure 6-9   Sample AOPBATCH to read the Infoprint Server message log

6.3.4 Messages to the hardcopy log

In the configuration file aopmsg.conf, which is shown in Figure 6-10, you can enable the Infoprint Server hardcopy log function. The hardcopy log function sends additional Infoprint Server messages to the z/OS system hardcopy log so that you can use a z/OS message automation facility to process these messages.

To create or modify the aopmsg.conf configuration file, follow these steps:

1. The user ID must be zero (0), or be able to switch into superuser mode.

2. Copy the sample message configuration file from /usr/lpp/Printsrv/samples/aopmsg.conf, to /etc/Printsrv/aopmsg.conf.

3. Change the owner of the file to UID 0:

   chown 0 /etc/Printsrv/aopmsg.conf

4. Change the group owner to AOPADMIN. AOPADMIN is the suggested RACF group name for Infoprint Server administrators. However, you might have used a different name for this group.

   chgrp AOPADMIN /etc/Printsrv/aopmsg.conf

5. Edit the message configuration file using your preferred editor and save your changes.

```
aopmsg.conf - Infoprint Server Message Configuration file
#     This file is optional.  If it is specified, the default location is:
#                      /etc/Printsrv/aopmsg.conf
#     In this file, you can request that Infoprint Server send additional
#     messages to the z/OS system hardcopy log. If this file does not exist,
#     only messages that Infoprint Server writes to the console are sent to
#     the hardcopy log.
#
#     You can specify these attributes in the file:
#         hardcopy-messages = all | list | none
#         hardcopy-message-list = {message1 message2 ...}
#-------------------------------------------------------------------------------
# Uncomment the line below to send all eligible messages to the hardcopy log.
# Eligible messages include messages from Infoprint Server daemons, but not
# messages from IP PrintWay basic mode.  For more information about which
# messages are eligible to be sent to the hardcopy log, see:
# "z/OS Infoprint Server Customization."
#
hardcopy-messages = all
#-------------------------------------------------------------------------------
# Uncomment the two lines below to send messages AOP3614I and AOP3803E to
# the hardcopy log.
#
#hardcopy-messages = list
#hardcopy-message-list = {AOP118I AOP119I AOP048E AOP3417I AOP120I AOP3417I }
#-------------------------------------------------------------------------------
# Uncomment the line below to send no additional messages to the hardcopy log.
# This is the default action if this file does not exist or the
# hardcopy-messages attribute is not specified.
#
#hardcopy-messages = none
```

Figure 6-10   aopmsg.conf configuration file

Selecting a hardcopy option

Choose the first option as follows:

```
hardcopy-messages = all | list | none
```

Where:

all   Sends all eligible messages to the hardcopy log.

list   Sends only the additional messages that are listed in the `hardcopy-message-list` attribute to the hardcopy log.

none   Sends no additional messages to the hardcopy log. Only console messages are sent to the hardcopy log. This is the default.

Choose the second option as follows:

```
hardcopy-message-list = {messageID messageID ...}
```

These are the message IDs of the messages that Infoprint Server sends to the hardcopy log when the hardcopy-messages=list attribute is specified. Specify the *entire* message ID, including the severity code (E, I, S, T, or W). You can use either upper case or lower case characters. As shown, enclose the list of messages in braces, and separate message IDs with spaces.

The default is: n**one**

Messages in the hardcopy

Figure 6-11 on page 128 displays Infoprint Server messages in the hardcopy log.

```
AOP048E 9.876.543.210: Unknown host. (program:aopwsmd) (job:JOB43496) 466
filename:SYS1.PROCLIB(JES3)) (dsn:VAINI.VAINI7.JOB43496.D0000010.
IB#JES3#) (job_selection_rule:SAPI)
AOP3417I IP PrintWay rejected the print job. The print job remains on 467
the JES spool. (program:aopwsmd) (job:PS000829) (filename:SYS1.
PROCLIB(JES3)) (dsn:VAINI.VAINI7.JOB43496.D0000010.IB#JES3#)
(job_selection_rule:SAPI)
AOP118I Job 831 document SC43RM02 started spooling to IAZFSS. 469
(program:aopnetd) (job:PS000831) (filename:SC43RM02) (dsn:ITSO.ITSO.
JOB43490.D000000D.SC43RM02)
AOP119I Job 831 document SC43RM02 completed spooling with status 470
"pending". (program:aopnetd) (job:PS000831) (filename:SC43RM02)
(dsn:ITSO.ITSO.JOB43490.D000000D.SC43RM02)
AOP034E shift-out-shift-in: The value 0 is not valid. (program:aopoutd 479
) (job:JOB43496) (filename:SYS1.PROCLIB(JES3)) (dsn:VAINI.VAINI8.JOB43
496.D0000011.IB#JES3#) (output_device:lpr://9.134.109.105/ebopcl).
AOP120I Job 836 document SC43RM02 started spooling to TOEVAIN with 495
transform afp2pdf.dll -c eu  . (program:aopnetd) (job:PS000836)
(filename:SC43RM02) (dsn:AOPSS.NETSPOOL.JOB43490.D000000E.SC43RM02)
AOP119I Job 836 document SC43RM02 completed spooling with status 496
"pending". (program:aopnetd) (job:PS000836) (filename:SC43RM02)
(dsn:AOPSS.NETSPOOL.JOB43490.D000000E.SC43RM02)
ANFM601I Data set: 510
WTSCPLX9.VAINI.VAINI1.JOB43496.D0000013.B#BPXAS# The data set was
successfully transmitted to host and queue: 9.12.4.148 PASS
ANFM604I Data set: WTSCPLX9.VAINI.VAINI1.JOB43496.D0000013.B#BPXAS# The data
set is being released to JES
```

Figure 6-11   Infoprint Server messages in the hardcopy log

Hardcopy considerations

If you do not enable the hardcopy log function, only messages that Infoprint Server sends to the console are sent to the hardcopy log. (Infoprint Server sends messages to the console that require the attention of an operator or administrator.) However, if you want non-console messages that are written only to the Infoprint Server common message log to be sent to the hardcopy log, you must enable the hardcopy log function.

The hardcopy log is either the system log (SYSLOG) or the operations log (OPERLOG), depending on how you configured the hardcopy medium in the HARDCOPY statement in the CONSOLxx parmlib member.

Notes:

► To use the hardcopy log function, you do not need to enable the common message log.
► The hardcopy log function cannot log messages from other programs, such as messages from IP PrintWay basic mode.
► If you change this attribute while any Infoprint Server daemons are running, restart all daemons.

6.3.5 A REXX tool to view the common message log

The Infoprint Server common message log is a simple flat file. This file can easily be read; scanned; and viewed partially.

A REXX program started under ISPF can bring up a panel where you can enter all needed information to select messages from the message log. It is useful when additional search keywords can be entered, so you can limit the number of messages to just those belonging to a certain user or printer.

The REXX program is invoked with the command `aoplgbrf`.

> **Note:** The REXX program to view the common message log is shown in Appendix D, "View the common message log tool" on page 193.

```
   Menu   List   Mode   Functions   Utilities   Help

                          ISPF Command Shell
Enter TSO or Workstation commands below:

===>     ---------- Infoprint Common Message Log Browse ----------
          Cmd ==>

          Select show time or Last minutes:
Place               Year Mo Da Ho Mi  -4 hours off from UTC
          Begin   ==> 2008 04 09 19 16  year month day hour minute
=> is    End     ==>                    year month day hour minute
=> mo     -or-                                                        ') type(z
=> om    Last    ==>                    minutes
=> p.
=> OM    User    ==>                    User ID filter
=> is    Chars   ==>                    Select with characters
=> bp
=> bp    F1=HELP      F2=SPLIT      F3=END        F4=RETURN
=> bp    F5=RFIND     F6=RCHANGE    F7=UP         F8=DOWN
=> bp
```

Figure 6-12   Viewing the log using a user-written ISPF application

6.4 View messages with Infoprint Central

Infoprint Central is the recommended tool to search for messages. From the Infoprint Server perspective, all messages belong to an object, which can be either a printer object or a job object. Messages can belong to current print jobs; when customized, they are also kept for historical print jobs.

Infoprint Central lets authorized users view messages in the common message log for selected print jobs and IP PrintWay extended mode printers. In addition, Infoprint Server administrators can use the `aoplogu` command to select messages in a particular time range and copy them to a file or view them on the terminal.

6.4.1 IP PrintWay Printer Information panel

From the Infoprint Central primary panel (shown in Chapter 5 in Figure 5-14 on page 103 and Figure 5-15 on page 105), you select a printer from the panel.

Then Figure 6-13 on page 130 will be displayed. The circled icon in this figure is the View log. When you select the View log, it displays all messages from the Infoprint Server common message log for the printer.
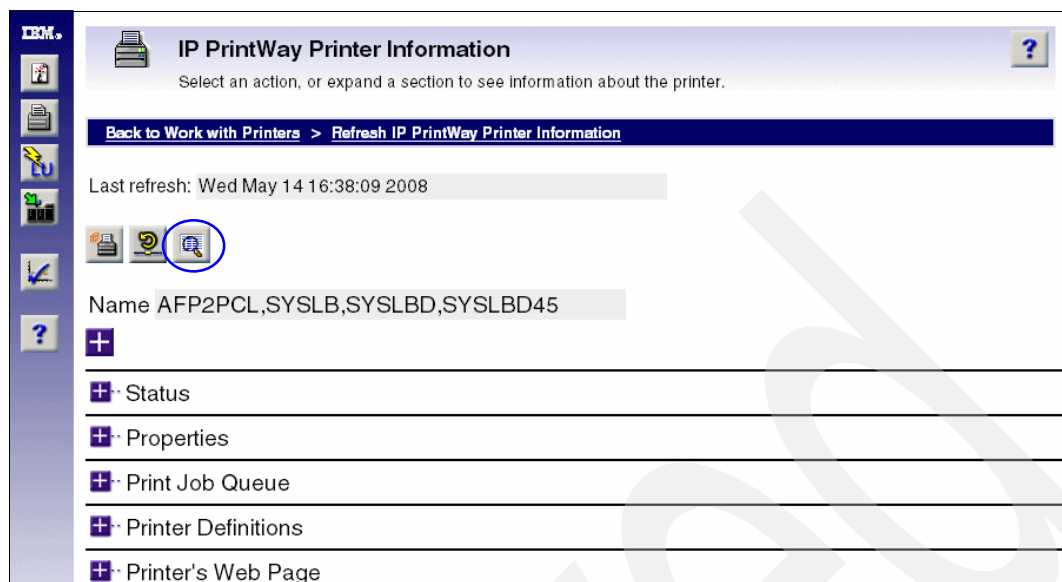
Figure 6-13   Infoprint Central IP PrintWay Printer Information panel

View log

Selecting the circled View log button brings you to Figure 6-14. This panel lists all messages from Infoprint Server for the selected printer. This panel also contains messages that record each action that Infoprint Central performed and the user ID of the user who selected the action. The fields preceding and following the message text contain additional information, such as the time the message was sent.

IP PrintWay Printer Log panel

To change the number of messages displayed, do the following:

► In the `Issued within:` field, select Days or Hours. Then select the number of days or the number of hours of messages you want to see. Infoprint Central displays all messages from that time period up to the maximum number.

► In the `Maximum messages to return` field, specify the maximum number (1 - 999) of messages you want to see.

► Select **Refresh**.
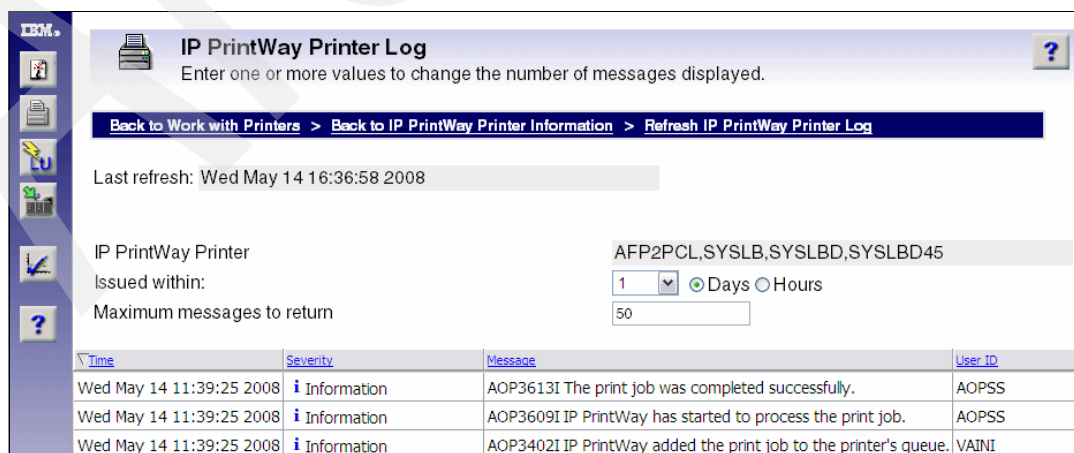
Figure 6-14   IP PrintWay Printer Log displaying printer messages

6.4.2 Infoprint Server Print Job Information panel

From the Infoprint Central primary panel shown in Figure 5-20 on page 113 and Figure 5-21 on page 114, you select a job. Then the Infoprint Server Print Job Information panel shown in Figure 6-15 is displayed. From this panel, you can see more information about the print job and perform additional actions, such as:

► Change priority
► Move
► View properties
► View log, as shown in Figure 6-15 with the circled icon
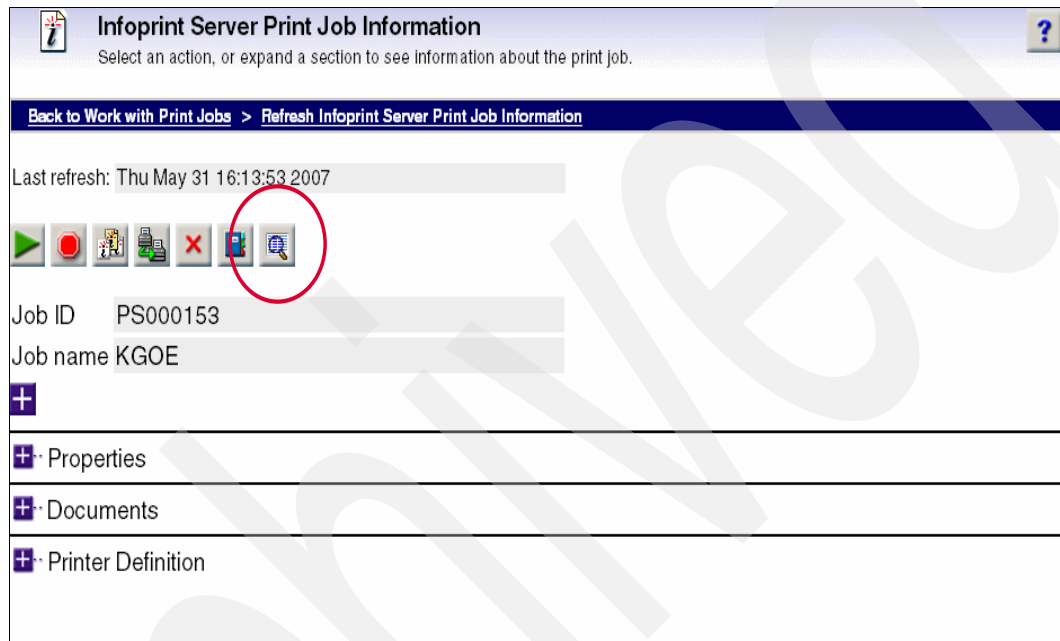
Figure 6-15   Infoprint Central work with print jobs

Infoprint Server Print Job Log

Infoprint Server provides support to Infoprint Central for quick access and display of Infoprint Server job and output device objects, including their searchable attributes and associated messages for help desk agents and end-users.

Infoprint Central also guarantees that job objects and some attributes, such as status and messages, are accessible for some period of time after a job has completed or failed. In other words, information about an Infoprint Server job is accessible independent of the Infoprint Server job's existence on the JES spool.

Figure 6-16   Infoprint Server Print job log

No client software is required. You simply start Infoprint Central in a Web browser, and click the appropriate icon. It is possible that end users can check the status of their own jobs, which can eliminate some calls to the help desk by allowing the users to perform their own problem determination.

> **Restriction:** Infoprint Central cannot show messages that were issued by other products, such as PSF for z/OS or JES.

6.4.3 View log for a printer

Infoprint Central lets authorized users view messages in the common message log for selected print jobs and IP PrintWay extended mode printers. In addition, Infoprint Server administrators can use the `aoplogu` command to select messages in a particular time range and copy them to a file or view them on the terminal. Enter this command from the z/OS UNIX command line.

The view log displays all messages from the Infoprint Server common message log for the printer. Messages from Infoprint Server Transforms and other transforms are not displayed. Ask your administrator to find those messages.

Result: The IP PrintWay Printer Log panel displays the messages.
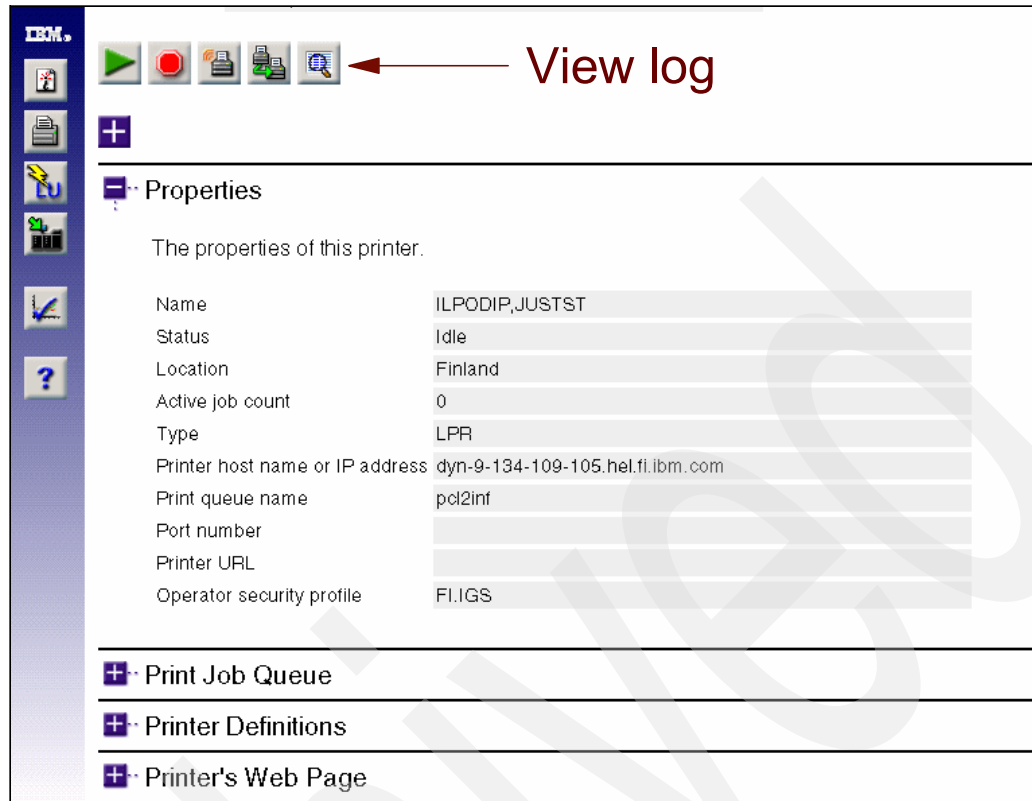
Figure 6-17   View the log for a printer

6.4.4 Viewing the printer log

IP PrintWay Printer Log panel lists messages from Infoprint Server for the selected printer. Fields before and after the message text contain additional information, such as the time the message was sent.

For more information about each message, you can use the z/OS LookAt online facility from the Internet:

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

You can also use your z/OS TSO/E host system to obtain more information about messages. You can install code on your z/OS or z/OS.e systems to access IBM message explanations by using LookAt from a TSO/E command line (for example: TSO/E prompt, ISPF, or z/OS UNIX System Services).

Note that messages from Print Services Facility (PSF), Infoprint Server Transforms, and other transforms for print jobs are *not* displayed. Ask your administrator for those messages.

Controlling messages displayed

In the panel shown in Figure 6-18 on page 134, you can change the number of messages displayed, as follows:

► In the `Issued within:` field, select the number of days of messages you want to see.

► In the `Maximum messages to return` field, specify the number (1 - 999) of messages you want to see.

► Select **Refresh**.

Figure 6-18   Example of a printer log

6.4.5 Messages from the OPERLOG

The common message log lets you see messages from most Infoprint Server components in one place. The log contains messages from all components of Infoprint Server except for IP PrintWay basic mode. It does not contain messages from Infoprint Server Transforms or other transform products.

IP PrintWay extended mode writes its messages only to the common message log. Other components, such as NetSpool and Print Interface, write their messages to other locations such as the NetSpool message-log data set and the system console log, as well as to the common message log.

Your administrator must customize the common message log to specify how many days of messages to keep. As previously mentioned, the default is that no messages are kept in the common message log.

Infoprint Central lets authorized users view messages in the common message log for selected print jobs and IP PrintWay extended mode printers. In addition, Infoprint Server administrators can use the `aoplogu` command to select messages in a particular time range and copy them to a file or view them on the terminal.

> **Note:** The OPERLOG massages shown in Figure 6-19 are *not* written by the Infoprint Server. They are extracted from the common message log by a started task running a REXX exec that uses the `aoplogu` command to retrieve the messages and write (WTO) them to the OPERLOG.

```
+AOP3505I IP PrintWay stopped the printer.             - VAINI
+AOP3012I IP PrintWay accepted the request to stop the printer.  - VAINI
AOPD00I VAINI1  (JOB31082) Prt: ILPODIP          - WTSCPLX4 VAINI
PS009716 LIST#AA# from: VAINI    / SC65
+AOP120I Job 9716 //u.clist(aa) started spooling to ILPODIP with
transform afp2ps.dll -c ed   duplex=yes. - JOB31082 - VAINI P
+AOP119I Job 9716 //u.clist(aa) completed spooling with status
"pending". - JOB31082 - VAINI PS009716
+AOP3504I IP PrintWay started the printer.          - VAINI
+AOP3011I IP PrintWay accepted the request to start the printer. - VAINI
+AOP3613I Job 9716 was completed. - JOB31082 - HAIMO PS009716
+AOP3012I IP PrintWay accepted the request to stop the printer.
+AOP3505I IP PrintWay stopped the printer.          - VAINI
AOPD00I VAINI1  (JOB31083) Prt: ILPODIP          - WTSCPLX4 VAINI
PS009718 LIST#AA# from: VAINI    / SC65
+AOP120I Job 9718 //u.clist(aa) started spooling to ILPODIP with
transform afp2ps.dll -c ed   duplex=yes. - JOB31083 - VAINI P
+AOP119I Job 9718 //u.clist(aa) completed spooling with status
"pending". - JOB31083 - VAINI PS009718
+AOP3011I IP PrintWay accepted the request to start the printer. - VAINI
+AOP3504I IP PrintWay started the printer.          - VAINI
+AOP3613I Job 9718 was completed. - JOB31083 - HAIMO PS009718
```

Figure 6-19   Viewing the printer log messages in the OPERLOG

7

Code page translation

This chapter describes how Infoprint Server converts line and text data from one encoding system into another one before transmitting a data set to the remote printer. Two of the most common encoding systems in use today are the American Standard Code for Information Interchange (ASCII) and the Extended Binary Coded Decimals Interchange Code (EBCDIC).

In fact, ASCII and EBCDIC are just examples. For information interchange, it is mandatory that data can be converted from one code page into another. Infoprint Server can use either the iconv utility or a TCP/IP translation table to convert data.

This chapter contains information about encoding systems. It discusses the concept of code pages. The following topics are discussed:

► Extended Binary Coded Decimals Interchange Code (EBCDIC)

► American Standard Code for Information Interchange (ASCII)

► Printer code page

► Document code page

► iconv utility

► Unicode Services

► Old-style translation

7.1 Data representation

Each character in a document data stream has a unique code, which is called a *code point*. Because each character can theoretically be assigned to every code point, encoding systems were created. Documents may be represented by a variety of code pages, such as:

```
ISO 8859-1, IBM-850, ROMAN8, .......
```

Consider, for example, *a-acute*:

- ► It is represented by x'E1' in ISO 8859-1.
- ► It is represented by x'A0' in the IBM IBM-850.
- ► It is represented by x'C4' in the HP ROMAN8.

ISO 8859-1, IBM-850, and the HP ROMAN8 encode the Latin1 character set.

These encoding systems were established many years ago for the purpose of providing vehicles for the interchange and presentation of data. Encoding systems such as ASCII and EBCDIC provide conventions for the placement of commonly used characters by means of code pages.

A *code page* is a table that associates character identifiers with code points, as shown in Figure 7-1 on page 139. Today, the printer code page being used often differs from the document code page which was used to encode line or text data.

Figure 7-1 on page 139 shows the encoding scheme used by code page 1047 (Latin1 Open Systems). This code page is the recommended code page for z/OS UNIX System Service.

HEX DIGITS 1ST→ / 2ND↓	4-	5-	6-	7-	8-	9-	A-	B-	C-	D-	E-	F-
-0	(SP) SP010000	& SM030000	‑ SP100000	ø LO610000	Ø LO620000	º SM190000	µ SM170000	¬ SM660000	{ SM110000	} SM140000	\ SM070000	0 ND100000
-1	(RSP) SP300000	é LE110000	/ SP120000	É LE120000	a LA010000	j LJ010000	~ SD190000	£ SC020000	A LA020000	J LJ020000	÷ SA060000	1 ND010000
-2	â LA150000	ê LE150000	Â LA160000	Ê LE160000	b LB010000	k LK010000	s LS010000	¥ SC050000	B LB020000	K LK020000	S LS020000	2 ND020000
-3	ä LA170000	ë LE170000	Ä LA180000	Ë LE180000	c LC010000	l LL010000	t LT010000	· SD630000	C LC020000	L LL020000	T LT020000	3 ND030000
-4	à LA130000	è LE130000	À LA140000	È LE140000	d LD010000	m LM010000	u LU010000	© SM520000	D LD020000	M LM020000	U LU020000	4 ND040000
-5	á LA110000	í LI110000	Á LA120000	Í LI120000	e LE010000	n LN010000	v LV010000	§ SM240000	E LE020000	N LN020000	V LV020000	5 ND050000
-6	ã LA190000	î LI150000	Ã LA200000	Î LI160000	f LF010000	o LO010000	w LW010000	¶ SM250000	F LF020000	O LO020000	W LW020000	6 ND060000
-7	å LA270000	ï LI170000	Å LA280000	Ï LI180000	g LG010000	p LP010000	x LX010000	¼ NF040000	G LG020000	P LP020000	X LX020000	7 ND070000
-8	ç LC410000	ì LI130000	Ç LC420000	Ì LI140000	h LH010000	q LQ010000	y LY010000	½ NF010000	H LH020000	Q LQ020000	Y LY020000	8 ND080000
-9	ñ LN190000	ß LS610000	Ñ LN200000	` SD130000	i LI010000	r LR010000	z LZ010000	¾ NF050000	I LI020000	R LR020000	Z LZ020000	9 ND090000
-A	¢ SC040000	! SP020000	¦ SM650000	: SP130000	« SP170000	ª SM210000	¡ SP030000	Ý LY120000	(SHY) SP320000	¹ ND011000	² ND021000	³ ND031000
-B	. SP110000	$ SC030000	, SP080000	# SM010000	» SP180000	º SM200000	¿ SP160000	¨ SD170000	ô LO150000	û LU150000	Ô LO160000	Û LU160000
-C	< SA030000	* SM040000	% SM020000	@ SM050000	ð LD630000	æ LA510000	Ð LD620000	¯ SM150000	ö LO170000	ü LU170000	Ö LO180000	Ü LU180000
-D	(SP060000	) SP070000	_ SP090000	' SP050000	ý LY110000	¸ SD410000	[SM060000	] SM080000	ò LO130000	ù LU130000	Ò LO140000	Ù LU140000
-E	+ SA010000	; SP140000	> SA050000	= SA040000	þ LT630000	Æ LA520000	Þ LT640000	' SD110000	ó LO110000	ú LU110000	Ó LO120000	Ú LU120000
-F	| SM130000	^ SD150000	? SP150000	" SP040000	± SA020000	¤ SC010000	® SM530000	× SA070000	õ LO190000	ÿ LY170000	Õ LO200000	(EO)

Figure 7-1   Code page CP1047 encoding scheme

7.2 The iconv utility

Infoprint Server uses the iconv utility to convert data between two code pages. The iconv utility converts a sequence of characters from one encoded character set (fromCodeSet) into a sequence of corresponding characters in another encoded character set (toCodeSet). You can specify the document-codepage and printer-codepages attribute that Infoprint Server uses as the source and target encoded character sets.

The iconv utility reads characters from the input file, converts them from fromCodeSet encoding to toCodeSet encoding, and writes them to the output file. The conversion is performed by the code conversion functions of the run-time library.

IP PrintWay extended mode

IP PrintWay extended mode uses the iconv utility to convert data between EBCDIC and ASCII. The iconv utility converts data from one code page to another; that is, from the code page used to create the document to the code page used by the printer. For more information

about the iconv utility, see *z/OS XL C/C++ Programming Guide*, SC09-4765. Print Interface and NetSpool also use iconv to convert data from EBCDIC to ASCII.

IP PrintWay basic mode

IP PrintWay basic mode can use one of these methods to convert data between EBCDIC and ASCII:

▶ The iconv utility (default method) converts data from one code page to another, from the code page used to create the document to the code page used by the printer.

▶ Print Interface and NetSpool also uses iconv to convert data from EBCDIC to ASCII. IBM recommends using this method because you can specify attributes in the printer definition that are suitable for both Print Interface and IP PrintWay. By default, IP PrintWay uses this method.

▶ TCP/IP translation tables. For compatibility with previous releases, you can request that IP PrintWay use either the standard TCP/IP translation table supplied by IBM or a customized TCP/IP translate table created using the CONVXLAT program. For information about using translation tables and the CONVXLAT program, see *z/OS Communications Server: IP Configuration Reference*, SC31-8776.

> **Note:** In z/OS V1R9, if _ICONV_MODE is not set to C, iconv will go directly to Unicode Services to perform character conversions without looking for any Language Environment-style user-created tables.

7.2.1 Creating a conversion table

If you want to print line data or text encoded data in a coded character set that does not have a one-to-one mapping to the printer code page (encoded character set used by the output device), create your own conversion table and compile it with the genxlt utility. Infoprint Server can use your own conversion table to convert your document to the printer code page being required.

▶ Gather needed characters
▶ Map the code points
▶ Compile the table
▶ Update the code set name table

> **Note:** Commonly used encode character sets are already provided by IBM.

7.2.2 Determine the glyph represented for each code point

Each EBCDIC coded character set consists of a mapping of all the available glyphs to their respective hex encodings and unique Graphic Character Global Identifiers (GCGIDs). GCGIDs are unique identifiers assigned to each character in the Unicode standard. A glyph is the printed appearance of a character. Each coded character set serves one linguistic environment.

You must map each code point in the fromCodeSet to the correct code point in the toCodeSet in order to produce the desired glyph, and it is a very simple mapping. Each graphic character (glyph) in a font has a unique name and can be assigned to a code point in each code set. Continue to fill up Table 7-1 on page 141 with all characters you are going to use.

Table 7-1   Sample conversion table

fromCodeSet IBM-1047	toCodeSet IBM-437 (PC-8)	glyph	global character identifier
0x7C	0x40	commercial at	SM050000
0xC1	0x41	latin capital letter A	LA020000
0xC2	0x42	latin capital letter B	LB020000
0xC3	0x43	latin capital letter C	LC020000

7.2.3 Using the genxlt utility to create a translate table

The genxlt utility reads a source translation file from input file, writes the compiled version to output file, and then generates the translation load module. The source translation file provides the conversion specification from fromCodeSet to toCodeSet.

The source translation file contains directives that are acted upon by the genxlt utility to produce the compiled version of the translation table. The genxlt utility creates the translate table EDCUaabb, where aa is the fromCodeSet and bb is the toCodeSet, as defined in the EDCUCSNM macro.

Note: To generate your own conversions, you must modify the codeset name table EDCUCSNM.

The mapping between Codeset and the two-letter CC code is defined in the CC conversion table EDCUCSNM. This table is built with assembler macros as follows:

```
EDCUCSNM TITLE 'CODE SET NAME CONVERSION TABLE'
EDCUCSNM CSECT
         EDCCSNAM TYPE=ENTRY,CODESET='IBM-037',CODE='EA'
         EDCCSNAM TYPE=ENTRY,CODESET='IBM-273',CODE='EB'
         EDCCSNAM TYPE=ENTRY,CODESET='IBM-274',CODE='EC'
         EDCCSNAM TYPE=ENTRY,CODESET='IBM-277',CODE='ED'
         EDCCSNAM TYPE=ENTRY,CODESET='IBM-278',CODE='EE'
  .
  .
  .
         EDCCSNAM TYPE=END
         END    EDCUCSNM
```

The prefix of the name is EDCU for non-XPLINK converters, because Infoprint Server is not XPLINK-enabled. These tables must be put into the Language Environment runtime library, or can be pointed to by a STEPLIB. Figure 7-2 on page 142 shows the JCL to use genxlt utility.

```
//       JOB
//LIB    JCLLIB ORDER=CEE.SCEEPROC
//GNXLT EXEC   PROC=EDCGNXLT,
//             INFILE='KGOE.JOB.CP(CP)',
//             OUTFILE='CEE.SCEERUN(EDCUEY01)',
//             LIBPRFX='CEE',
//             OPT='NODBCS'
```

Figure 7-2   JCL to use the genxlt utility

7.2.4 Updating the codeset name table

To generate a conversion table, you must modify the codeset name table EDCUCSNM. This table contains entries that relate code pages to 2-character identifiers which are used to locate the member in the Language Environment run-time library. A sample EDCUCSNM table, CEE.CEESAMP(EDCUCSNM), contains table source for IBM provided code sets. Add yours here to preserve IBM-supplied values. The table is built with assembler macros. as shown in Figure 7-3.

```
//        JOB
//CL      EXEC PROC=ASMACL
//C.SYSLIB  DD DISP-SHR,DSN=CEE.SCEEMAC
//L.SYSLMOD DD DISP=SHR,DSN=KGOE.CP(EDCUCSNM)
//C.SYSIN   DD *
EDCUCSNM TITLE 'CODE SET NAME CONVERSION TABLE'
EDCUCSNM CSECT
EDCUCSNM AMODE ANY
EDCUCSNM RMODE ANY
        EDCCSNAM TYPE=ENTRY,CODESET='IBM-4946',CODE='AA'
        EDCCSNAM TYPE=ENTRY,CODESET='IBM-850',CODE='AA'
        EDCCSNAM TYPE=ENTRY,CODESET='IBM-301',CODE='AB'
.
.
.
***************************************************************
* U2 is a special case for UCS-2 codeset                      *
***************************************************************
        EDCCSNAM TYPE=ENTRY,CODESET='UCS-2',CODE='U2'
***************************************************************
* This section reserved for customer defined codesets         *
* which must follow the form '0x' thru '9x' where x is         *
* any alphanumeric character (0-9, A-Z)                        *
***************************************************************
        EDCCSNAM TYPE=ENTRY,CODESET='UPPERCASE',CODE='01'
***************************************************************
EDCCSNAM TYPE=END
        END
/*
```

Figure 7-3   Sample job to generate a conversion table

7.2.5 Using indirect or direct conversion

z/OS iconv supports use of UCS-2 as an intermediate code set for conversion of characters encoded in one code set to another. The _ICONV_UCS2 environment variable instructs iconv_open("Y", "X") whether or not to set up indirect conversion from code set X to code set Y using UCS-2 as an intermediate code set.

The default behavior for iconv prior to z/OS 1.9 is to try to perform a direct conversion for any code set pair if a direct conversion table is available for that code set pair. If a direct conversion table is not available for that code set pair, then an indirect conversion is performed instead, using UCS-2 as an intermediate code set.

> **Important:** In z/OS 1.9, if _ICONV_MODE is not set to C, iconv() will go directly to Unicode Services to perform character conversions without looking for any Language Environment-style user-created tables. Note that _ICONV_UCS2 will not be honored while using Unicode Services.

z/OS iconv recognizes the following values for _ICONV_UCS2:

1   Set up indirect conversion using UCS-2 first. The indirect conversions will use direct Unicode converters, if available. If not available, iconv_open() will fopen/fread uconvTable binaries. If the setup of indirect conversion fails, iconv_open() will try to set up direct conversion.

2   Set up direct conversion first. If this fails, try to set up indirect conversion using UCS-2. The indirect conversions will use direct unicode converters if available. If not available, iconv_open() will fopen/fread uconvTable binaries. This is the default.

3   Set up direct conversion first. If this fails, try to set up indirect conversion using UCS-2. The indirect conversions will use direct unicode converters. If direct unicode converters are unavailable, the iconv_open() request fails.

N   Never set up indirect conversion using UCS-2. If a direct converter cannot be found, the iconv_open() request fails.

D   Never set up indirect conversion using UCS-2. If a direct converter cannot be found, the iconv_open() request fails.

O   Only set up indirect conversion using UCS-2. iconv_open() will fopen/fread uconvTable binaries. Direct unicode converters will not be used. If required unconvTable binaries cannot be found, the iconv_open() request fails.

U   Only set up indirect conversion using UCS-2. The indirect conversions will use direct unicode converters, if available. If not available, iconv_open() will fopen/fread uconvTable binaries.

UCS-2 converters reside in a data set named prefix.SCEEUTBL, where the prefix for these data sets defaults to CEE. If an installation uses a prefix different from CEE for these data sets, it also must use the environment variable _ICONV_UCS2_PREFIX to specify the value of the prefix before using iconv_open() to set up UCS-2 converters.

The uconvTable binaries are also installed in the HFS directory named /usr/lib/nls/locale/uconvTable. The iconv_open() function searches for uconvTable binaries in the HFS before looking in the z/OS UCS-2 data set. You can use the LOCPATH environment variable to give iconv_open() a colon-separated list of path name prefixes to use instead of /usr/lib/nls/locale/ to find uconvTable directories in your HFS.

7.2.6 Modifying an existing conversion table

You can modify existing code set pairs, or add new ones. For example, the uconvdef utility reads an input source file and produces uconvTable binary files required by uconv_open(). The input source file defines a mapping between UCS-2 and user-created code sets. Source may be found in a HFS directory named /usr/lib/nls/locale/ucmap/.

```
uconvdef [-f SrcFile] [-v] uconvTable
```

You can use of the LOCPATH environment variable to separate your own built translate tables from the standard ones, because the directory is replaced with each upgrade of the operating system / root HFS.

> **Important:** In order for Infoprint Server to see a modified LOCPATH value, it must be set in the aopstart exec.

7.3 Unicode Services

Starting in z/OS V1R7, the Unicode environment can be dynamically updated. Callers can invoke Unicode Services and the tables required for respective service will be loaded as they are referenced. Unicode Services allows you to add up to ten different defined conversion tables for conversions between the same pair of CCSIDs by using reserved numeric (0-9) techniques.

You can also define new CCSIDs for your own purposes. Keep in mind that these CCSIDs must not conflict with the predefined CCSIDs shipped with z/OS support for Unicode.

> **Note:** Beginning with z/OS 1.9, the iconv() family of functions was modified to utilize Unicode Services Conversion Services under the covers. Therefore, it is advisable to migrate user-created tables from Language Environment to Unicode Services.
>
> For an interim period, you can set _ICONV_MODE to C to continue to use Language Environment-style user tables.

Each conversion table is identified by its member name in the form CUNtaabb, where:

► t is the technique character.
► aa is the suffix from the knowledge base entry representing the defined From-CCSID.
► bb is the suffix from the knowledge base entry representing the defined To-CCSID.

Conversion tables that were not yet loaded are only searched in data set SYS1.SCUNTBL. Therefore, this name needs to be used. If an installation uses a different data set name, it may use the following alias entry in the catalog:

```
DEFINE ALIAS (NAME(SYS1.SCUNTBL) -
              SYMBOLICRELATE('SYS1.&PLEX..&OSLEVEL..SCUNTBL')) -
              CATALOG(CATALOG.MCAT)
```

First, Unicode Services searches for a direct conversion table for the requested character conversion it will use. If a direct conversion table is not found, it will do an indirect conversion instead, using UCS-2 as an intermediate code set.

Note that the CCSID of the most recent UCS-2 version is substituted and all technique-characters are tested. Then the second recent UCS-2 version is substituted and so on. The supported UCS-2 CCSIDs are:

- ► 21680 (Unicode 4.0)
- ► 17584 (Unicode 3.0)
- ► 13488 (Unicode 2.0)

7.3.1 Defining a CCSID in the knowledge base

IBM supplies a knowledge base module, CUNMIKBS, which describes all CCSIDs shipped with z/OS support for Unicode. User-defined CCSIDs can be added to this knowledge base using the assembler macro CUNAIKBG, which is supplied in SYS1.MACLIB.

```
//        JOB
//LIB     JCLLIB ORDER=ASM.SASMSAM1
//CL      EXEC PROC=ASMACL,
//        PARM.L='NCAL,MAP,LIST,LET,NOXREF,REUS'
//C.SYSPRINT DD SYSOUT=*
//C.SYSLIB  DD DSN=SYS1.MACLIB,DISP=SHR
//SYSLIN    DD DSN=&OBJ(USERKBS),SPACE=(3040,(40,40,5),,,ROUND),
//          DISP=(MOD,PASS),UNIT=VIO,
//          DCB=(BLKSIZE=3040,LRECL=80,RECFM=FB,BUFNO=1)
//C.SYSIN   DD *
USERKBS  CSECT
USERKBS  AMODE 31
USERKBS  RMODE ANY
CP       CUNAIKBG CCSID=59999,
              ES=1100,
              SUFFIX=XX,
              CCDEF=(1,1,1,1,1,1),
              STRINGT=1,
              CP=59999
         END   USERKBS
/*
//L.LINKLIB  DD DISP=SHR,DSN=SYS1.LINKLIB
//L.SYSLMOD  DD DISP=SHR,DSN=CPAC.LINKLIB
//L.SYSLIB   DD DSN=&OBJ,DISP=(OLD,DELETE)
//L.SYSLIN   DD *
   ORDER CUNMIKBS
   ORDER USERKBS
   ORDER CUNMIEOF
   MODE  AMODE(31),RMODE(ANY)
   INCLUDE LINKLIB(CUNMIKBS)
   INCLUDE SYSLIB(USERKBS)
   ENTRY CUNMIKBS
 NAME CUNMIKBS(R)
/*
```

Figure 7-4   Job to define a CCSID in the knowledge base

For more information, refer to *Character Data Representation Architecture Reference and Registry*, SC09-2190, and *z/OS Support for Unicode: Using Unicode Services*, SA22-7649.

7.3.2 Converting a character map to binary format

To convert a character map to binary format, start by using an existing conversion table and create a character map out of it. Then make changes to the map. Finally, convert it back to binary format. Or, you can type in the complete character map with the editor of your choice and then convert it into binary format.

```
//         JOB
//XLTSTEP  EXEC PGM=CUNMITG1,PARM='00273,17584,L'
//TABIN    DD   DISP=SHR,DSN=SYS1.SCUNTBL
//CHAROUT  DD   DISP=SHR,DSN=KGOE.JOB.UNICODE(MAP0)
//SYSPRINT DD   SYSOUT=*
```

Figure 7-5   Job to build a human-readable character map

Specify PARM='From-CCSID,To-CCSID,technique' on the EXEC card where From-CCSID is the source CCSID of the conversion and To-CCSID is the target CCSID of the conversion. Technique is one specific technique character.

```
//         JOB
//XLTSTEP  EXEC PGM=CUNMITG2,PARM='00273,17584,L'
//CHARIN   DD   DISP=SHR,DSN=KGOE.JOB.UNICODE(MAP0)
//TABOUT   DD   DISP=SHR,DSN=SYS1.SCUNTBL
//SYSPRINT DD   SYSOUT=*
```

Figure 7-6   Job to convert a character map into binary format

7.4 Old-style-translation

IP PrintWay basic mode can also use a standard TCP/IP translate table to convert data from one code page into another. In that case, use the CONVXLAT utility to generate an MVS data set containing the binary translation table you require.

However, when the printer definition specifies a code page in either the document-codepage or printer-codepage attribute, then IP PrintWay uses the iconv utility and the specified code pages to convert data.

Note: IP Printway extended mode uses iconv only.

7.5 Sample conversion table for IBM-1047 to PC-8 (IBM-437)

In this section we provide a sample conversion table for IBM-1047 to PC-8 (IBM-437). Note that lines where the initial nonwhite space character is the pound (#) sign are treated as comments. Source for the code set converter is shipped in the CEE.SCEEGXLT data set.

```
#**********************************************************************
#* GENXLT file for IBM-1047 to IBM-437 (PC-8)                        *
#*                                                                   *
#* This codeset is to show what a conversion table looks like.        *
#* It maps all code points from IBM-1047 to IBM-437.                 *
#* All it does is to fold lower case character into an upper          *
```

```
#* case letter.                                                       *
#* Please check the symbol set installed and used by the printer.     *
#*                                                                     *
#* All characters which cannot be converted are treated as            *
#* undefined and are replaced by a smiling face.                      *
#*                                                                     *
#***********************************************************************
#
#IBM-1047    IBM-437    comment                        global ID
#---------  ---------  ----------------------  -----------------------
0x00        0x00       NUL
0x01        0x01       SOH
0x02        0x02       STX
0x03        0x03       ETX
0x04        0x01       not defined in IBM-437
0x05        0x09       horizontal-tab
0x06        0x01       not defined in IBM-437
0x07        0x1c       IS4
0x08        0x01       not defined in IBM-437
0x09        0x01       not defined in IBM-437
0x0a        0x01       not defined in IBM-437
0x0b        0x0b       vertical-tab
0x0c        0x0c       form-feed
0x0d        0x0d       carriage-return
0x0e        0x0e       SO
0x0f        0x0f       SI
0x10        0x10       DLE
0x11        0x11       DC1
0x12        0x12       DC2
0x13        0x13       DC3
0x14        0x01       not defined in IBM-437
0x15        0x0a       newline
0x16        0x08       backspace
0x17        0x01       not defined in IBM-437
0x18        0x18       CAN
0x19        0x19       EM
0x1a        0x01       not defined in IBM-437
0x1b        0x01       not defined in IBM-437
0x1c        0x1c       file separator
0x1d        0x1d       group separator
0x1e        0x1e       record separatot
0x1f        0x1f       unit separator
0x20        0x01       not defined in IBM-437
0x21        0x01       not defined in IBM-437
0x22        0x01       not defined in IBM-437
0x23        0x01       not defined in IBM-437
0x24        0x01       not defined in IBM-437
0x25        0x0a       LF
0x26        0x01       not defined in IBM-437
0x27        0x1b       ESC
0x28        0x01       not defined in IBM-437
0x29        0x01       not defined in IBM-437
0x2a        0x01       not defined in IBM-437
0x2b        0x01       not defined in IBM-437
0x2c        0x01       not defined in IBM-437
```

```
0x2d       0x05       ENQ
0x2e       0x06       ACK
0x2f       0x07       alert
0x30       0x01       not defined in IBM-437
0x31       0x01       not defined in IBM-437
0x32       0x16       SYN
0x33       0x01       not defined in IBM-437
0x34       0x01       not defined in IBM-437
0x35       0x01       not defined in IBM-437
0x36       0x01       not defined in IBM-437
0x37       0x04       EOT
0x38       0x01       not defined in IBM-437
0x39       0x01       not defined in IBM-437
0x3a       0x01       not defined in IBM-437
0x3b       0x01       not defined in IBM-437
0x3c       0x14       DC4
0x3d       0x15       NAK
0x3e       0x01       not defined in IBM-437
0x3f       0x01       not defined in IBM-437
0x40       0x20       space                    <SP010000>
0x41       0xff       RSP                      <SP300000>
0x42       0x83       a-circumflex             <LA150000>
0x43       0x84       a-diaeresis              <LA170000>
0x44       0x85       a-grave>                 <LA130000>
0x45       0xa0       a-acute>                 <LA110000>
0x46       0x01       not defined in IBM-437
0x47       0x86       a-ring                   <LA270000>
0x48       0x87       c-cedilla                <LC410000>
0x49       0xa4       n-tilde                  <LN190000>
0x4a       0x9b       cent sign                <SC040000>
0x4b       0x2e       period                   <SP110000>
0x4c       0x3c       less-than-sign           <SA030000>
0x4d       0x28       left-parenthesis         <SP060000>
0x4e       0x2b       plus-sign                <SA010000>
0x4f       0x7c       vertical-line            <SM130000>
0x50       0x26       ampersand                <SM030000>
0x51       0x82       e-acute                  <LE110000>
0x52       0x88       e-circumflex             <LE150000>
0x53       0x89       e-diaeresis              <LE170000>
0x54       0x8a       e-grave                  <LE130000>
0x55       0xa1       i-acute                  <LI110000>
0x56       0x8c       i-circumflex             <LI150000>
0x57       0x8b       i-diaeresis              <LI170000>
0x58       0x8d       i-grave                  <LI130000>
0x59       0xe1       s-sharp                  <LS610000>
0x5a       0x21       exclamation-mark         <Sp020000>
0x5b       0x24       dollar-sign              <SC030000>
0x5c       0x2a       asterisk                 <SM040000>
0x5d       0x29       right-parenthesis        <SP070000>
0x5e       0x3b       semicolon                <SP140000>
0x5f       0x5e       circumflex               <SD150000>
0x60       0x2d       hyphen                   <SP100000>
0x61       0x2f       slash                    <SP1200000>
0x62       0x01       not defined in IBM-437
0x63       0x8e       A-diaeresis              <LA180000>
```

```
0x64      0x01      not defined in IBM-437
0x65      0x01      not defined in IBM-437
0x66      0x01      not defined in IBM-437
0x67      0x8f      A-ring                  <LA280000>
0x68      0x80      C-cedilla               <LC420000>
0x69      0xa5      N-tilde                 <LN200000>
0x6a      0x01      not defined in IBM-437
0x6b      0x2c      comma                   <SP080000>
0x6c      0x25      percent-sign            <SM020000>
0x6d      0x5f      underscore              <SP090000>
0x6e      0x3e      greater-than-sign       <SA050000>
0x6f      0x3f      question-mark           <SP150000>
0x70      0x01      not defined in IBM-437
0x71      0x90      E-acute                 <LE120000>
0x72      0x01      not defined in IBM-437
0x73      0x01      not defined in IBM-437
0x74      0x01      not defined in IBM-437
0x75      0x01      not defined in IBM-437
0x76      0x01      not defined in IBM-437
0x77      0x01      not defined in IBM-437
0x78      0x01      not defined in IBM-437
0x79      0x60      grave-accent            <SD130000>
0x7a      0x3a      colon                   <SP130000>
0x7b      0x23      number-sign             <SM010000>
0x7c      0x40      commercial-at           <SM050000>
0x7d      0x27      apostrophe              <SP050000>
0x7e      0x3d      equals-sign             <SA040000>
0x7f      0x22      quotation-mark          <SP040000>
0x80      0x01      not defined in IBM-437
0x81      0x41      a translated to A       <LA010000>
0x82      0x42      b translated to B       <LB010000>
0x83      0x43      c translated to C       <LC010000>
0x84      0x44      d translated to D       <LD010000>
0x85      0x45      e translated to E       <LE010000>
0x86      0x46      f translated to F       <LF010000>
0x87      0x47      g translated to G       <LG010000>
0x88      0x48      h translated to H       <LH010000>
0x89      0x49      i translated to I       <LI010000>
0x8a      0xae      left-angle-quotes       <SP170000>
0x8b      0xaf      right-angle-quotes      <SP180000>
0x8c      0x01      not defined in IBM-437
0x8d      0x01      not defined in IBM-437
0x8e      0x01      not defined in IBM-437
0x8f      0xf1      plus-minus              <SA020000>
0x90      0xf8      degree                  <SM190000>
0x91      0x4a      j translated to J       <LJ010000>
0x92      0x4b      k translated to K       <LK010000>
0x93      0x4c      l translated to L       <LL010000>
0x94      0x4d      m translated to M       <LM010000>
0x95      0x4e      n translated to N       <LN010000>
0x96      0x4f      o translated to O       <LO010000>
0x97      0x50      p translated to P       <LP010000>
0x98      0x51      q translated to Q       <LQ010000>
0x99      0x52      r translated to R       <LR010000>
0x9a      0xa6      feminine                <SM210000>
```

```
0x9b    0xa7    masculine               <SM200000>
0x9c    0x91    ae                      <LA510000>
0x9d    0x01    not defined in IBM-437
0x9e    0x92    AE                      <LA520000>
0x9f    0x01    not defined in IBM-437
0xa0    0xe6    micro sign              <SM170000>
0xa1    0x7e    tilde                   <SD190000>
0xa2    0x53    s translated to S       <LS010000>
0xa3    0x54    t translated to T       <LT010000>
0xa4    0x55    u translated to U       <LU010000>
0xa5    0x56    v translated to V       <LV010000>
0xa6    0x57    w translated to W       <LW010000>
0xa7    0x58    x translated to X       <LX010000>
0xa8    0x59    y translated to Y       <LY010000>
0xa9    0x5a    z translated to Z       <LZ010000>
0xaa    0xad    exclamation-down        <SP030000>
0xab    0xa8    question-down           <SP160000>
0xac    0x01    not defined in IBM-437
0xad    0x5b    left-square-bracket     <SM060000>
0xae    0x01    not defined in IBM-437
0xaf    0x01    not defined in IBM-437
0xb0    0xaa    not                     <SM660000>
0xb1    0x9c    sterling                <SC020000>
0xb2    0x9D    yen                     <SC050000>
0xb3    0xfa    dot                     <SD630000>
0xb4    0x01    not defined in IBM-437
0xb5    0x15    section                 <SM240000>
0xb6    0x14    paragraph               <SM250000>
0xb7    0xac    one-quarter             <NF040000>
0xb8    0xab    one-half                <NF010000>
0xb9    0x01    not defined in IBM-437
0xba    0x01    not defined in IBM-437
0xbb    0x01    not defined in IBM-437
0xbc    0x01    not defined in IBM-437
0xbd    0x5d    right-square-bracket     <SM080000>
0xbe    0x01    not defined in IBM-437
0xbf    0x01    not defined in IBM-437
0xc0    0x7b    left-brace              <SM110000>
0xc1    0x41    capital letter A        <LA020000>
0xc2    0x42    capital letter B        <LB020000>
0xc3    0x43    capital letter C        <LC020000>
0xc4    0x44    capital letter D        <LD020000>
0xc5    0x45    capital letter E        <LE020000>
0xc6    0x46    capital letter F        <LF020000>
0xc7    0x47    capital letter G        <LG020000>
0xc8    0x48    capital letter H        <LH020000>
0xc9    0x49    capital letter I        <LI020000>
0xca    0x01    not defined in IBM-437
0xcb    0x93    o-circumflex            <LO150000>
0xcc    0x94    o-diaeresis             <LO170000>
0xcd    0x95    o-grave                 <LO130000>
0xce    0xa2    o-acute                 <LO110000>
0xcf    0x01    not defined in IBM-437>
0xd0    0x7d    right-brace             <SM140000>
0xd1    0x4a    capital letter J        <LJ020000>
```

```
0xd2      0x4b      capital letter K      <LK020000>
0xd3      0x4c      capital letter L      <LL020000>
0xd4      0x4d      capital letter M      <LM020000>
0xd5      0x4e      capital letter N      <LN020000>
0xd6      0x4f      capital letter O      <LO020000>
0xd7      0x50      capital letter P      <LP020000>
0xd8      0x51      capital letter Q      <LQ020000>
0xd9      0x52      capital letter R      <LR020000>
0xda      0x01      not defined in IBM-437
0xdb      0x96      u-circumflex          <LU150000>
0xdc      0x81      u-diaeresis           <LU170000>
0xdd      0x97      u-grave               <LU130000>
0xde      0xa3      u-acute               <LU110000>
0xdf      0x98      y-diaeresis           <LY170000>
0xe0      0x5c      backslash             <SM070000>
0xe1      0xf6      divide                <SA060000>
0xe2      0x53      capital letter S      <LS020000>
0xe3      0x54      capital letter T      <LT020000>
0xe4      0x55      capital letter U      <LU020000>
0xe5      0x56      capital letter V      <LV020000>
0xe6      0x57      capital letter W      <LW020000>
0xe7      0x58      capital letter X      <LX020000>
0xe8      0x59      capital letter Y      <LY020000>
0xe9      0x5a      capital letter Z      <LZ020000>
0xea      0xfd      two-superior          <ND021000>
0xeb      0x01      not defined in IBM-437
0xec      0x99      O-diaeresis           <LO180000>
0xed      0x01      not defined in IBM-437
0xee      0x01      not defined in IBM-437
0xef      0x01      not defined in IBM-437
0xf0      0x30      zero                  <ND100000>
0xf1      0x31      one                   <ND010000>
0xf2      0x32      two                   <ND020000>
0xf3      0x33      three                 <ND030000>
0xf4      0x34      four                  <ND040000>
0xf5      0x35      five                  <ND050000>
0xf6      0x36      six                   <ND060000>
0xf7      0x37      seven                 <ND070000>
0xf8      0x38      eight                 <ND080000>
0xf9      0x39      nine                  <ND090000>
0xfa      0x01      not defined in IBM-437
0xfb      0x01      not defined in IBM-437
0xfc      0x9a      U-diaeresis           <LU180000>
0xfd      0x01      not defined in IBM-437
0xfe      0x01      not defined in IBM-437
0xff      0x01      not defined in IBM-437
```

A

Sample IP Printway user exit

This appendix provides a sample begin data set exit that can be used to add a PCL setup string in front of each data set. Depending on the LRECL, you may choose another font or another page layout.

153

A.1 Instructions for downloading the sample programs

In the download instructions, do the following:

► myuser in these instructions is your user ID. So replace your user ID where you see myuser. Also, my.email@xx.com is your e-mail address.

► Retrieve the files sample.programs.unload.bin in binary to your workstation or directly into your z/OS system from this IBM Redbooks Web site.

   This can be done using your favorite browser (not shown here) or an ftp session.

► Following are samples of how to do this with ftp sessions.

```
Scenario 1: Getting the data directly to your z/OS system

ftp www.redbooks.ibm.com
User: anonymous
Password: my.email@xx.com
cd redbooks/SG247458/
lcd 'myuser'
locsite blk=3120 lrecl=80 recfm=fb
binary
get sg247458.clist.unload.bin sg247458.clist.unload
quit

Note: You may also decide to pre-allocate the unloaded files as XMIT-ed sequential files
instead of using the LOCSITE setting.
```

Figure A-1   Scenario 1 - download directly to your z/OS system

```
Scenario 2: Getting the files to your workstation first

ftp www.redbooks.ibm.com
User: anonymous
Password: my.email@xx.com
cd redbooks/SG247458/
binary
get sg247458.clist.unload.bin
quit

The following example shows how to transfer the files to z/OS from your
workstation afterwards.

ftp my.zos.system
User: myuser
Password: mypasswd
cd 'myuser'
binary
quote site blk=3120 lrecl=80 recfm=fb
put sg247458.clist.unload.bin sg247458.clist.unload
quit
```

Figure A-2   Scenario 2 - download to your workstation

```
Final installation steps

Afterwards run the following command on your z/OS system:

tso receive indsn('myuser.sg247458.clist.unload')

On display of the following messages you may request to restore the original
PDS data set with a desired new data set name (You may also decide to rename
the data set after completion of the receive command.):

INMR901I Dataset ROGERS.SG247458.CLIST from ROGERS on WTSCPLX4
INMR906A Enter restore parameters or 'DELETE' or 'END' +

Here is a sample to set the data set name.

dsn('myuser.sg247458.clist')
tso receive indsn(sg247458.clist.unload)
Dataset ROGERS.SG247458.CLIST from ROGERS on WTSCPLX4
Enter restore parameters or 'DELETE' or 'END' +
[enter]
```

Figure A-3   Final install instructions

A.2 Sample IP PrintWay begin data set exit

This exit can be used to add a PCL setup string at the beginning of each output data set.

Example: A-1   Sample exit

```
ANFUXBDS TITLE 'Begin Dataset Exit'
*
****** START OF SPECIFICATIONS ****************************************
*                                                                    *
* MODULE NAME = ANFUXBDS                                             *
*                                                                    *
* DESCRIPTIVE NAME = Begin dataset Exit which adds PCL Setup strings *
*                    at the beginning of each Output depending on the *
*                    max. record lenght                              *
*                                                                    *
* FUNCTION =                                                         *
*        checks max. record length and adds corresponding setup PCL  *
*                                                                    *
*                                                                    *
* MODULE TYPE = PROCEDURE                                            *
*    PROCESSOR = Assembler                                           *
*    ATTRIBUTES =                                                    *
*        REENTRANT                                                   *
*        AMODE(31)                                                   *
*        RMODE(ANY)                                                  *
*                                                                    *
* PATCH LABEL = none                                                 *
*                                                                    *
* ENTRY POINT =                                                      *
*        ANFUXBDS                                                    *
*                                                                    *
```

```
*     LINKAGE =                                                    *
*           LOAD ANFUXBDS                                          *
*           CALL ANFUXBDS(addr(ANFUEXTP))                          *
*           calling module passes address of Common Parameter     *
*           area.                                                  *
*                                                                  *
* CHANGE ACTIVITY =                                                *
* 04/01/12    Initial Version                                      *
*                                                                  *
***** END OF SPECIFICATIONS ****************************************
*
ANFUXBDS CSECT ,                      Establish the csect
ANFUXBDS AMODE ANY                    It addresses all storage
ANFUXBDS RMODE ANY                    It can reside anywhere
         USING ANFUXBDS,R15           Establish temporary addressability  X
                                      to module
         B     INIT                   Branch around copyright information
ANFUXBDS MODID BR=NO                        EYECATCHER INFO
         DC    C'THIS USER EXIT HAD BEEN DEVELOPED AS IS BY'
         DC    C'KLAUS GOETZE IN ORDER TO SUPPORT DYNAMIC  '
         DC    C'PCL SETUP INFORMATION DEPENDING ON THE MAX'
         DC    C'RECORD LENGTH'
*
*-----------------------------------------------------------------*
*    ANFUXBDS Module entry point                                  *
*-----------------------------------------------------------------*
*
INIT     DS    0H
         STM   R14,R12,12(R13)        Save callers registers
         LR    R12,R15                Move base register to R12
         DROP  R15                    Done with this register
         USING ANFUXBDS,R12           R12 is base reg for program code
         L     R2,0(R1)               get the parm pointer
         USING ANFUEXTP,R2            R2 is base for parm area
         ST    R13,XTPSAVE+4          chain save areas
         LA    R15,XTPSAVE            get my save area
         ST    R15,8(R13)             point callers save area to it
         LR    R13,R15                point R13 to my save area
*
*-----------------------------------------------------------------*
*       Initialisation complete, ready for work                   *
*-----------------------------------------------------------------*
*                                                                  *
* The only thing we have to do is look at the maximum record length *
* and select one of five possible cases :                         *
*                                                                  *
* recod length < 81  ->>>    setup string 1   HS081066  -> ESC1   *
* recod length < 121 ->>>    setup string 2   HS120088  -> ESC2   *
* recod length < 133 ->>>    setup string 3   L4S13266  -> ESC3   *
* recod length < 151 ->>>    setup string 4   L4S15066  -> ESC4   *
* recod length > 150 ->>>    setup string 5   L4D20080  -> ESC5   *
*                                                                  *
********************************************************************
*                                                                  *
* LOGIC - look at XTPMRECL and if necessary consider 1 byte CC     *
*         as defined by JFCRECFM                                   *
*                                                                  *
* Attention - for variable length record note that the 4 byte length *
*             prefix does not belong to max. record length reported. *
*                                                                  *
```

```
*                                                                     *
* JFCRECFM  BITSTRING   1  JFCRECFM - RECORD FORMAT (DCB=RECFM=)       *
*                                              (AMP=('RECFM='))        *
*           111.  ....     JFCRCFM    "X'E0'" - RECORD FORMAT          *
*                                              (USASI/USASCII)         *
*           11..  ....     JFCFMREC   "X'C0'" - HIGH-ORDER TWO BITS    *
*                                              OF JFCRECFM TO BE       *
*                                              TESTED FOR RECORD       *
*                                              FORMAT                  *
*           11..  ....     JFCUND     "X'C0'" - U UNDEFINED            *
*           1...  ....     JFCFIX     "X'80'" - F FIXED                *
*           .1..  ....     JFCVAR     "X'40'" - V VARIABLE             *
*           ..1.  ....     JFCVARD    "X'20'" - D VARIABLE (FORMAT D   *
*                                                FOR USASI/USASCII)    *
*           ..1.  ....     JFCRFO     "X'20'" - T - TRACK OVERFLOW     *
*           ...1  ....     JFCRFB     "X'10'" - B - BLOCKED            *
*                                              - MAY NOT OCCUR         *
*                                                WITH UNDEFINED        *
*           ....  1...     JFCRFS     "X'08'" - S - FOR FIXED LENGTH   *
*                                                RECORD FORMAT,        *
*                                        STANDARD BLOCKS NO TRUCATED   *
*                                        BLOCKS OR UNFILLED TRACKS ARE *
*                                        EMBEDDED IN THE DATA SET. FOR *
*                                        VARIABLE LENGTH RECORD FORMAT,*
*                                        SPANNED RECORDS.              *
*           ....  .11.     JFCCHAR    "X'06'" - CONTROL CHARACTER      *
*           ....  .1..     JFCASA     "X'04'" - A AMERICAN NATIONAL    *
*                                                CONTROL CHARACTER     *
*                                                (IOS/ANSI)            *
*           ....  ..1.     JFCMAC     "X'02'" - M MACHINE CODE CONTOL  *
*                                                CHARACTER             *
*           ....  ....     JFCNOCC    "X'00'" - NO CONTROL CHARACTER   *
*                                                                     *
*---------------------------------------------------------------------*
*
START    DS    0H
         LH    R5,XTPMRECL
         TM    XTPDSFLG,XTPDSCC       are there Control Character
         BZ    ADD1
         S     R5,=F'1'               if yes, LRECL - 1 Byte CC
*
*---------------------------------------------------------------------*
*                                                                     *
*                                                                     *
* The max. LRECL is stored into R5                                    *
*                                                                     *
* IF  R5 <  81 then  ESC1   ( max. LRECL <  81      )                 *
* IF  R5 < 120 then  ESC2   ( max. LRECL =  81 - 120 )                *
* IF  R5 < 132 then  ESC3   ( max. LRECL = 121 - 132 )                *
* IF  R5 < 150 then  ESC4   ( max. LRECL = 133 - 150 )                *
*            else  ESC5   ( max. LRECL > 150      )                   *
*                                                                     *
*---------------------------------------------------------------------*
*
ADD1     CL    R5,=F'80'             LRECL < 80
         BP    ADD2                  No
         LA    R3,ESC1               get the predefined ESC string
         LA    R4,LESC1              get the length of the string
         B     PUT                   get out
ADD2     CL    R5,=F'120'            LRECL = 81 - 120
         BP    ADD3                  No
```

```
          LA    R3,ESC2               get the predefined ESC string
          LA    R4,LESC2              get the length of the string
          B     PUT                   Get out
ADD3      CL    R5,=F'132'            LRECL = 121 - 132
          BP    ADD4                  No
          LA    R3,ESC3               get the predefined ESC string
          LA    R4,LESC3              get the length of the string
          B     PUT                   Get out
ADD4      CL    R5,=F'150'            LRECL < 133 - 150
          BP    ADD5                  No
          LA    R3,ESC4               get the predefined ESC string
          LA    R4,LESC4              get the length of the string
          B     PUT                   Get out
*                                     LRECL > 150
ADD5      LA    R3,ESC5               get the predefined ESC string
          LA    R4,LESC5              get the length of the string
*
*---------------------------------------------------------------------*
*         Return to caller                                            *
*---------------------------------------------------------------------*
*
          DS    0H
PUT       ST    R3,XTPERPTR           store the address
          ST    R4,XTPERLEN           store the length
          MVI   XTPRCFLG,0            zero flag
          OI    XTPRCFLG,XTPRLAST     don't call me again
          OI    XTPRCFLG,XTPRCEXT     print the record
          L     R13,XTPSAVE+4         address of caller's save area
          LM    R14,R12,12(R13)       Restore caller's registers
          BR    R14                   Return to MVS
*
*---------------------------------------------------------------------*
*         Pre-defined setup strings                                   *
*---------------------------------------------------------------------*
* FORMAT 'ESC-1'                                                      *
*                                                                     *
* ALLOW FOR LRECL < 81 COLUMNS BY 66 LINES PER PAGE                   *
* PLACED ON PAGE SO PAPER MAY BE 3-HOLE PUNCHED DOWN LEFT SIDE        *
* FONT IS COURIER                                                     *
*                                                                     *
*---------------------------------------------------------------------*
*         LRECL < 81
ESC1      DC    X'1B45'               RESET
*         DC    X'45534331'           ID for ESC1
          DC    X'1B266C323641'       PAPER SIZE A4
          DC    X'1B266C3053'         SELECT SIMPLEX PRINT-VERT BIND
          DC    X'1B266C31383055'     LEFT OFFSET=180 DECIPOINTS
*         DC    X'1B266C3548'         PAPER SOURCE=FACH 3 ?
          DC    X'1B266C304F'         PORTRAIT
          DC    X'1B28313255'         PC850 SYMBOL SET
          DC    X'1B28733050'         PRI SPACING IS FIXED
          DC    X'1B2873313248'       PRI PITCH IS 12
          DC    X'1B2873313056'       PRI POINT SIZE IS 10
          DC    X'1B28733053'         PRI STYLE IS UPRIGHT
          DC    X'1B28733042'         PRI STROKE WEIGHT IS NORMAL
          DC    X'1B28733430393954'   PRI TYPEFACE IS COURIER
          DC    X'1B266B31302E3348'   HMI = 10,3
          DC    X'1B266C372E383043'   VMI = 7,80
          DC    X'1B266C3245'         TOP MARGIN IS 2
          DC    X'1B2661324C'         LEFT MARGIN IS 2
```

```
*        DC    X'1B266C363746'      TEXT LENGTH = 66 LINES
         DC    X'1B266C314C'        ENABLE PERF SKIP
         DC    X'1B26733043'        ENABLE END-OF-LINE WRAP
         DC    X'1B26613052'        VERT CUR POS = ROW 0
LESC1    EQU   *-ESC1               LENGTH OF ESC1
*-----------------------------------------------------------------------*
* FORMAT 'ESC-2'                                                         *
*                                                                       *
* ALLOW FOR LRECL < 121 COLUMNS BY 66 LINES PER PAGE                     *
* PLACED ON PAGE SO PAPER MAY BE 3-HOLE PUNCHED                          *
* OFFSETTING IS USED BECAUSE OF THE DUPLEXING                            *
*                                                                       *
*-----------------------------------------------------------------------*
*        LRECL 81 - 120
ESC2     DC    X'1B45'              RESET
*        DC    X'45534332'          ID for ESC2
         DC    X'1B266C3153'        SELECT DUPLEX PRINT- VERT BIND
         DC    X'1B266C31383055'    LEFT OFFSET=180 DECIPOINTS
         DC    X'1B266C3548'        FEED FROM PAPER DECK
         DC    X'1B266C304F'        PORTRAIT
         DC    X'1B28313255'        PC850 SYMBOL SET
         DC    X'1B28733050'        PRI SPACING IS FIXED
         DC    X'1B287331352E3548'  PRI PITCH IS 15.5
         DC    X'1B2873313056'      PRI POINT SIZE IS 10
         DC    X'1B28733053'        PRI STYLE IS UPRIGHT
         DC    X'1B28733042'        PRI STROKE WEIGHT IS NORMAL
         DC    X'1B28733430393954'  PRI TYPEFACE IS COURIER
         DC    X'1B266B372E3248'    HMI = 7,4  -> 7,4/120*120 120
         DC    X'1B266C362E303043'  VMI = 6,00 -> 11/088*48    088
         DC    X'1B266C3245'        TOP MARGIN IS 2
         DC    X'1B2661344C'        LEFT MARGIN IS 4
*        DC    X'1B266C363746'      TEXT LENGTH = 66 LINES
         DC    X'1B266C314C'        ENABLE PERF SKIP
         DC    X'1B26733043'        ENABLE END-OF-LINE WRAP
         DC    X'1B26613052'        VERT CUR POS = ROW 0
LESC2    EQU   *-ESC2               LENGTH OF ESC2
*-----------------------------------------------------------------------*
* FORMAT 'ESC-3'                                                         *
*                                                                       *
* ALLOW FOR LRECL < 133 COLUMNS BY 66 LINES PER PAGE                     *
* PLACED ON PAGE SO PAPER MAY BE 3-HOLE PUNCHED                          *
* OFFSETTING IS USED BECAUSE OF THE DUPLEXING                            *
*                                                                       *
*-----------------------------------------------------------------------*
*        LRECL 121 - 132
ESC3     DC    X'1B45'              RESET
*        DC    X'45534333'          ID for ESC3
         DC    X'1B266C3053'        SIMPLEX
         DC    X'1B266C2B31383055'  LEFT OFFSET=180 DECIPOINTS
         DC    X'1B266C3548'        FEED FROM PAPER DECK
         DC    X'1B266C314F'        LANDSCAPE
         DC    X'1B28313255'        PC850 SYMBOL SET
         DC    X'1B28733050'        PRI SPACING IS FIXED
         DC    X'1B2873313548'      PRI PITCH IS 15
         DC    X'1B2873382E3556'    PRI POINT SIZE IS 8.5
         DC    X'1B28733053'        PRI STYLE IS UPRIGHT
         DC    X'1B28733042'        PRI STROKE WEIGHT IS NORMAL
         DC    X'1B28733430393954'  PRI TYPEFACE IS COURIER
         DC    X'1B266C352E3136333643' VMI = 5.1636
         DC    X'1B266B313048'      HMI = 10
```

```
         DC    X'1B266C3445'          TOP MARGIN IS 4
         DC    X'1B2661324C'          LEFT MARGIN IS 2
         DC    X'1B266C314C'          ENABLE PERF SKIP
         DC    X'1B26733043'          ENABLE END-OF-LINE WRAP
         DC    X'1B26613052'          VERT CUR POS = ROW 0
LESC3    EQU   *-ESC3                 LENGTH OF ESC3
         *-------------------------------------------------------------------*
         * FORMAT 'ESC-4'                                                    *
         *                                                                   *
         * ALLOW FOR LRECL < 151 COLUMNS BY 66 LINES PER PAGE               *
         * PLACED ON PAGE SO PAPER MAY BE 3-HOLE PUNCHED                     *
         * OFFSETTING IS USED BECAUSE OF THE DUPLEXING                       *
         *                                                                   *
         *-------------------------------------------------------------------*
         *         LRECL 133 - 150
ESC4     DC    X'1B45'                RESET
*        DC    X'45534334'            ID for ESC4
         DC    X'1B266C3053'          SIMPLEX
         DC    X'1B266C31383055'      LEFT OFFSET=180 DECIPOINTS
         DC    X'1B266C3548'          FEED FROM PAPER DECK
         DC    X'1B266C314F'          LANDSCAPE
         DC    X'1B28313255'          PC850 SYMBOL SET
         DC    X'1B28733050'          PRI SPACING IS FIXED
         DC    X'1B2873313548'        PRI PITCH IS 15
         DC    X'1B2873382E3556'      PRI POINT SIZE IS 8.5
         DC    X'1B28733053'          PRI STYLE IS UPRIGHT
         DC    X'1B28733042'          PRI STROKE WEIGHT IS NORMAL
         DC    X'1B28733430393954'    PRI TYPEFACE IS COURIER
         DC    X'1B266C352E3136333643' VMI = 5.1636
         DC    X'1B266B382E3848'      HMI= 8.8
         DC    X'1B266C3445'          TOP MARGIN IS 4
         DC    X'1B2661324C'          LEFT MARGIN IS 2
*        DC    X'1B266C363746'        TEXT LENGTH = 66 LINES
         DC    X'1B266C314C'          ENABLE PERF SKIP
         DC    X'1B26733043'          ENABLE END-OF-LINE WRAP
         DC    X'1B26613052'          VERT CUR POS = ROW 0
LESC4    EQU   *-ESC4                 LENGTH OF ESC4
         *-------------------------------------------------------------------*
         * FORMAT 'ESC-5'                                                    *
         *                                                                   *
         * ALLOW FOR LRECL > 150 COLUMNS BY 66 LINES PER PAGE               *
         * PLACED ON PAGE SO PAPER MAY BE 3-HOLE PUNCHED                     *
         * OFFSETTING IS USED BECAUSE OF THE DUPLEXING                       *
         *                                                                   *
         *-------------------------------------------------------------------*
         *         LRECL > 150
ESC5     DC    X'1B45'                RESET
*        DC    X'45534335'            ID for ESC5
         DC    X'1B266C3153'          SELECT DUPLEX PRINT- VERT BIND
         DC    X'1B266C30373255'      LEFT OFFSET=072 DECIPOINTS
         DC    X'1B266C3548'          FEED FROM PAPER DECK
         DC    X'1B266C314F'          LANDSCAPE
         DC    X'1B28313255'          PC850 SYMBOL SET
         DC    X'1B28733050'          PRI SPACING IS FIXED
         DC    X'1B2873313548'        PRI PITCH IS 15
         DC    X'1B2873382E3556'      PRI POINT SIZE IS 8.5
         DC    X'1B28733053'          PRI STYLE IS UPRIGHT
         DC    X'1B28733042'          PRI STROKE WEIGHT IS NORMAL
         DC    X'1B28733430393954'    PRI TYPEFACE IS COURIER
         DC    X'1B266C342E3332303043' VMI = 4.3200   80 ROWS
```

```
         DC    X'1B266B362E3648'     HMI = 6.6
         DC    X'1B266C3645'         TOP MARGIN IS 6
         DC    X'1B2661324C'         LEFT MARGIN IS 2
*        DC    X'1B266C363746'       TEXT LENGTH = 66 LINES
         DC    X'1B266C314C'         ENABLE PERF SKIP
         DC    X'1B26733043'         ENABLE END-OF-LINE WRAP
         DC    X'1B26613052'         VERT CUR POS = ROW 0
LESC5    EQU   *-ESC5                LENGTH OF ESC5
*
         PRINT ON
         ANFUEXTP
*
R0       EQU   0
R1       EQU   1
R2       EQU   2
R3       EQU   3
R4       EQU   4
R5       EQU   5
R6       EQU   6
R7       EQU   7
R8       EQU   8
R9       EQU   9
R10      EQU   10
R11      EQU   11
R12      EQU   12
R13      EQU   13
R14      EQU   14
R15      EQU   15
         END   ,                     End of ANFUXBDS module
```

Sample HTTP Server configuration file

This appendix includes a sample configuration file. The sample Web server configuration allows you to access Infoprint Server Central Web pages if you are a member of an AOPOPER or AOPADMIN group.

You can customize your Web server configuration by editing the file. For most configuration directives, your updates take effect when you restart the Web server.

B.1 Sample httpd.conf file

The recommended changes to the httpd.conf configuration file are located in /usr/lpp/Printsrv/samples, and the file name is httpd.conf.updates. Figure B-1 contains the file.

```
# Make the following changes to the httpd.conf file
# for Infoprint Central.
# The directives are listed in the order that they should appear
# in the httpd.conf file.

# Make sure you add the following PASS rules
#      1. Before the ServerInit directive
#      2. Before the generic rule, "Pass /*"
Pass           /Infoprint/Scripts/*    /usr/lpp/Printsrv/InfoprintCentral/Scripts/*
Pass           /Infoprint/Images/*     /usr/lpp/Printsrv/InfoprintCentral/Images/*
Pass           /Infoprint/help/En_US/*  /usr/lpp/Printsrv/InfoprintCentral/help/En_US/*
Pass           /Infoprint/En_US/*.html  /usr/lpp/Printsrv/InfoprintCentral/html/En_US/*.html


# If you ordered the Japanese feature, uncomment the following lines:
# Make sure they are added before the ServerInit directive
#Pass          /Infoprint/Ja_JP/*.html  /usr/lpp/Printsrv/InfoprintCentral/html/Ja_JP/*.html.binary
#Pass          /Infoprint/help/Ja_JP/*.htm  /usr/lpp/Printsrv/InfoprintCentral/help/Ja_JP/*.htm.binary
#Pass          /Infoprint/help/Ja_JP/*      /usr/lpp/Printsrv/InfoprintCentral/help/Ja_JP/*
#AddEncoding    .binary       8bit    1.0     #
#AddType  .html text/html     binary  1.0     # Ja_JP html
#AddType  .htm  text/html     binary  1.0     # Ja_JP htm



#        ServerInit directive:
ServerInit /usr/lpp/Printsrv/lib/aopcentral.so:initialize*


#        Service directive:
Service /Infoprint*       /usr/lpp/Printsrv/lib/aopcentral.so:dllMain*

# Make sure the following AddType directives are added towards the end
# of the AddType directives section
AddType .js  application/x-javascript  ebcdic  1.0 # JavaScript
AddType .htc text/x-component          ebcdic  1.0 # .htc files
AddType .css text/css                  ebcdic  1.0 # W3C cascading style sheets
```

Figure B-1   httpd.conf.updates file

> **Important:** The sample file shown in Example B-1 contains the changes for Infoprint Central. The changes are shown in bold text.
>
> Most of the comments and statements have been removed from the sample configuration file. The sample file contains only statements that you should update after.
>
> When you update this file, in order to find the locations for the updates, follow these steps:
>
> 1. Issue f 'protection IMW_Admin'
>   – Add the Protection AOP_USER changes (or whatever you decide to use).
> 2. Issue f 'new pass rules here'
>   – Add the Infoprint Server PASS rules here.
> 3. Issue f 'UserId   %%CLIENT%%'
>   – Add a user ID directive.
> 4. Issue f 'AddType'
>   – Add directives for Infoprint Central Web pages into that section.

Example: B-1   Sample httpd.conf

```
# COMPONENT_NAME: web httpd.conf
# (C) COPYRIGHT International Business Machines Corporation 1997
# All Rights Reserved
# This software is subject to the IBM Software Agreement
# Restricted Rights for U.S. government users, and applicable export
# regulations. IBM is a registered trademark and IBM HTTP Server
# is a trademark of IBM Corporation.
# =================================================================== #
#         Sample configuration file for httpd, running as a normal
#         HTTP server.
#         TABLE OF CONTENTS
#         =================
#         - Basic directives
#         - Logging and Reporting directives
#             * log purge/archive directives
#             * access log filter directives
#             * example report templates
#         - Method directives
#         - Directories and Welcome page directives
#             * Directory browsing directives
#         - Error Message Customization
#         - User directory directives
#         - GWAPI directives:
#         - User authentication and document protection
#         - Service directives
#             * HTImage directives
#             * HTCounter directives
#         - Mapping rules
#         - Performance directives.
#         - Timeout directives
#         - Security directives.
#         - Proxy directives
#         - Proxy caching directives
```

```
#          - File caching directives
#          - Work Load Management directives
#          - SNMP directives
#          - Icon directives
#          - Request Processing directives
#          Basic directives
# ======================================================================= #
# All surrogate UserIds specified for use by the Web Server
#          must be given as MVS Login names, not numeric UIDs.  They must also
#          be defined as BPX.SRV.xxxxx profiles in the SURROGATE CLASS and the
#          Web Server must be permitted UACC(READ) to them.
#          NOTE: The special UserId %%CLIENT%% may be used instead of a
#                surrogate UserId.  The MVS Web Server will require the client
#                to supply a valid local MVS UserId and password.  The request
#                will be served under that UserId.  The client's UserId does not
#                need to be defined under the surrogate class and the Web Server
#                does not need special permissions.  (Under basic authentication
#                the client's password is transmitted encoded but not encrypted)
#          NOTE: The special UserId %%CERTIF%% may be used instead of a
#                surrogate UserId.  The MVS Web Server, when presented with a
#                SSL session with client certificate data present, will attempt
#                to map the client certificate to a local MVS UserId and password.
#                (This requires underlying OS/390 and security product support.)
#                If the session isn't SSL, or there isn't a certificate present,
#                or the underlying support is not available, or the certificate
#                can't be mapped, then the request will be treated as if
#                %%CLIENT%% had be specified. Note that SSLClientAuth must be On
#                in order to get client certificate data.
#          NOTE: The special UserId %%SERVER%% may be used instead of a
#                surrogate UserId.  The MVS Web Server will serve documents
#                from its own MVS userid when this is specified. This should
#                be used carefully, especially if running as superuser.
#          Default:  %%CLIENT%%
#          Syntax:   UserId <user name>
# Example:
# UserId     PUBLIC
# UserId     %%CLIENT%%
# UserId     %%CERTIF%%
# UserId     %%SERVER%%
# Infoprint Server UserId directive
UserId     %%CLIENT%%
#============================================================================
# User authentication and document protection
#========================================================
# Within the configuration file, there are three directives that
# define file access protection:
#          Protect, DefProt, and Protection.
# A Protection setup contains subdirectives that define how to a set
# of resources is to be ptrotected. The protection setup is used on
#          a DefProt or Protect directive. The subdirectives can be coded
#             * on a preceding Protection directive
#              * in-line on the DefProt or Protect directive
#              * in a separate protection file
# Protection PROT-SETUP-USERS {
#          ServerId           YourServersFancyName
```

```
#        AuthType        Basic
#        PasswdFile      %%SAF%%
#        GroupFile       %%SAF%%
#        GET-Mask        user, user, group, group, user
#----------------------------------------------------------------------------
Protection IMW_Admin {
        ServerId        WebServer_Administration
        AuthType        Basic
        PasswdFile      %%SAF%%
        Mask            WEBADM,webadm
}

#        The following rules will allow anyone who is a member of
#        AOPOPER or AOPADMIN to use InfoPrint Central application        .
#
Protection AOP_USER  {
        ServerId        InfoPrint_Server_Operation
        UserID          %%CLIENT%%
        AuthType        Basic
        GroupFile       %%SAF%%
        PasswdFile      %%SAF%%
        Mask            AOPOPER,AOPADMIN
}


Protect /Infoprint*        AOP_USER


# ===================================================================== #
#        REXX mapping rules
# ===================================================================== #
# Pass          /REXX/*                    /usr/lpp/internet/server_root/rexx/*
#        Scripts: URLs starting with /cgi-bin/ will be understood as
#        script calls in the directory /usr/lpp/internet/server_root/cgi-bin/
#        URLs starting with /admin-bin/ will be understood as
#        script calls in the directory /usr/lpp/internet/server_root/admin-bin/
Pass   /admin-bin/webexec/*    /usr/lpp/internet/server_root/admin-bin/webexec/*
Exec   /cgi-bin/*              /usr/lpp/internet/server_root/cgi-bin/*
Exec   /admin-bin/*           /usr/lpp/internet/server_root/admin-bin/*
Exec   /Docs/admin-bin/*      /usr/lpp/internet/server_root/admin-bin/*
#        URL translation rules; If your documents are under
#        /usr/lpp/internet/server_root/pub/ then this single rule does the job:
Pass   /icons/*               /usr/lpp/internet/server_root/icons/*
Pass   /Admin/*.jpg           /usr/lpp/internet/server_root/Admin/*.jpg
Pass   /Admin/*.gif           /usr/lpp/internet/server_root/Admin/*.gif
Pass   /Admin/*.html          /usr/lpp/internet/server_root/Admin/*.html
Pass   /Docs/*                /usr/lpp/internet/server_root/Docs/*
Pass   /reports/javelin/*     /usr/lpp/internet/server_root/pub/reports/javelin/*
Pass   /reports/java/*        /usr/lpp/internet/server_root/pub/reports/java/*
Pass   /reports/*             /usr/lpp/internet/server_root/pub/reports/*
Pass   /img-bin/*             /usr/lpp/internet/server_root/img-bin/*
# *** ADD NEW PASS RULES HERE ***
#
# *    PASS RULES for InfoPrint Central  ( keep them together )
#*********************************************************************************
Pass /Infoprint/Scripts/*     /usr/lpp/Printsrv/InfoprintCentral/Scripts/*
Pass /Infoprint/Images/*      /usr/lpp/Printsrv/InfoprintCentral/Images/*
```

```
Pass /Infoprint/help/En_US/*  /usr/lpp/Printsrv/InfoprintCentral/help/En_US/*
Pass /Infoprint/En_US/*.html  /usr/lpp/Printsrv/InfoprintCentral/html/En_US/*.html
# =====================================================================
# Printsrv directives
# =====================================================================
#*****************************************************************************
# *   ServerInit directive added for InfoPrint Central
#*****************************************************************************
ServerInit /usr/lpp/Printsrv/lib/aopcentral.so:initialize*
#*****************************************************************************
# *   Service directive added for InfoPrint Central
#*****************************************************************************
Service /Infoprint*        /usr/lpp/Printsrv/lib/aopcentral.so:dllMain*
Pass            /*                    /usr/lpp/internet/server_root/pub/*
# ===================================================================== #
#         Request Processing directives
# ===================================================================== #
#         SuffixCaseSense directive:
#         Specify whether case sensitivity for suffixes is on or off.
#         Default:  off
#         Syntax:   SuffixCaseSense  <on | off>
#         NOTE: This directive should be BEFORE any AddType, AddEncoding or
#               AddLanguage directives.
SuffixCaseSense    off
#         AddType directive:
#         Map suffixes to the content-type of a file.
#         Defaults:  see list below
#         Syntax:     Addtype <.suffix><representation><encoding><quality>
#                     where <quality> is optional
AddType  .arm     application/x-x509-ca-cert       ebcdic  1.0
AddType  .cer     application/x-x509-user-cert     ebcdic  0.5
AddType  .crt     application/x-x509-ca-cert       ebcdic  1.0
AddType  .der     application/x-x509-ca-cert       binary  1.0  # CA Certificate
AddType  .mime    /mime                            binary  1.0 # Internal - MIME
AddType  .bin     application/octet-stream         binary  1.0 # binary
AddType  .class   application/octet-stream         binary  1.0 # Java applet
#AddType .oda     application/oda                  binary  1.0
AddType  .pdf     application/pdf                  binary  1.0
AddType  .ai      application/postscript           ebcdic  0.5 # Adobe
AddType  .PS      application/postscript           ebcdic  0.8 # PostScript
AddType  .eps     application/postscript           ebcdic  0.8
AddType  .ps      application/postscript           ebcdic  0.8
AddType  .rtf     application/x-rtf                ebcdic  1.0 # RTF
AddType  .csh     application/x-csh               ebcdic  0.5 # C-shell script
#AddType .dvi     application/x-dvi                binary  1.0 # TeX DVI
#AddType .hdf     application/x-hdf                binary  1.0 # NCSA HDF data
AddType  .latex   application/x-latex             ebcdic  1.0 # LaTeX source
#AddType .nc      application/x-netcdf            binary  1.0 # Unidata netCDF
AddType  .cdf     application/x-cdf               ebcdic  1.0
AddType  .sh      application/x-sh               ebcdic  0.5 # Shell-script
AddType  .tcl     application/x-tcl              ebcdic  0.5 # TCL-script
AddType  .tex     application/x-tex              ebcdic  1.0 # TeX source
#AddType .texi    application/x-texinfo          ebcdic  1.0 # Texinfo
#AddType .texinfo application/x-texinfo          ebcdic  1.0
AddType  .t       application/x-troff            ebcdic  0.5 # Troff
```

```
AddType  .roff     application/x-troff             ebcdic  0.5
AddType  .tr       application/x-troff             ebcdic  0.5
AddType  .man      application/x-troff-man         ebcdic  0.5 # Troff with man
AddType  .me       application/x-troff-me          ebcdic  0.5 # Troff with me
AddType  .ms       application/x-troff-ms          ebcdic  0.5 # Troff with ms
#AddType .src      application/x-wais-source       ebcdic  1.0 # WAIS source
#AddType .bcpio    application/x-bcpio             binary  1.0 # Old binary CPIO
#AddType .cpio     application/x-cpio              binary  1.0 # POSIX CPIO
AddType  .gtar     application/x-gtar              binary  1.0 # Gnu tar
AddType  .shar     application/x-shar              ebcdic  1.0 # Shell archive
#AddType .sv4cpio  application/x-sv4cpio           binary  1.0 # SVR4 CPIO
#AddType .sv4crc   application/x-sv4crc            binary  1.0 # SVR4 CPIO
AddType  .wrl      x-world/x-vrml                  binary  1.0 # VRML
#     The following are neutral CAE formats:
#AddType .igs      application/iges                binary  1.0 # IGES Graphics
#AddType .iges     application/iges                binary  1.0 # IGES Graphics
#AddType .IGS      application/iges                binary  1.0 # IGES Graphics
#AddType .IGES     application/iges                binary  1.0 # IGES Graphics
#AddType .stp      application/STEP                ebcdic  1.0 # ISO-10303 STEP
#AddType .STP      application/STEP                ebcdic  1.0
#AddType .step     application/STEP                ebcdic  1.0
#AddType .STEP     application/STEP                ebcdic  1.0
#AddType .dxf      application/dxf                 binary  1.0 # DXF (AUTODESK)
#AddType .DXF      application/dxf                 binary  1.0
#AddType .vda      application/vda                 binary  1.0 # VDA-FS Surface
#AddType .VDA      application/vda                 binary  1.0
#AddType .set      application/set                 ebcdic  1.0 # (French CAD)
#AddType .SET      application/set                 ebcdic  1.0
#AddType .stl      application/SLA                 ebcdic  1.0
#AddType .STL      application/SLA                 ebcdic  1.0
#     The following are vendor-specific CAD-formats commonly
#     used at CERN and in HEP institutes:
#AddType .dwg      application/acad                binary  1.0 # Autocad drawing
#AddType .DWG      application/acad                binary  1.0
#AddType .SOL      application/solids              binary  1.0 # MATRA Prelude
#AddType .DRW      application/drafting            binary  1.0 # PreludeDrafting
#AddType .prt      application/pro_eng             binary  1.0 # Pro/ENGINEER
#AddType .PRT      application/pro_eng             binary  1.0
#AddType .unv      application/i-deas              binary  1.0 # SDRC I-DEAS
#AddType .UNV      application/i-deas              binary  1.0
#AddType .CCAD     application/clariscad           binary  1.0 # ClarisCAD files
AddType  .snd      audio/basic                    binary  1.0 # Audio
AddType  .au       audio/basic                    binary  1.0
AddType  .aiff     audio/x-aiff                   binary  1.0
AddType  .aifc     audio/x-aiff                   binary  1.0
AddType  .aif      audio/x-aiff                   binary  1.0
AddType  .wav      audio/x-wav                    binary  1.0 # Windows+ WAVE
AddType  .bmp      image/bmp                      binary  1.0 # OS/2 bitmap
AddType  .gif      image/gif                      binary  1.0 # GIF
AddType  .ief      image/ief                      binary  1.0 # Image Exchange
AddType  .jpg      image/jpeg                     binary  1.0 # JPEG
AddType  .JPG      image/jpeg                     binary  1.0
AddType  .JPE      image/jpeg                     binary  1.0
AddType  .jpe      image/jpeg                     binary  1.0
AddType  .JPEG     image/jpeg                     binary  1.0
```

```
AddType  .jpeg      image/jpeg                         binary  1.0
AddType  .tif       image/tiff                         binary  1.0 # TIFF
AddType  .tiff      image/tiff                         binary  1.0
AddType  .ras       image/cmu-raster                   binary  1.0
AddType  .pnm       image/x-portable-anymap            binary  1.0 # PBM Anymap
AddType  .pbm       image/x-portable-bitmap            binary  1.0 # PBM Bitmap
AddType  .pgm       image/x-portable-graymap           binary  1.0 # PBM Graymap
AddType  .ppm       image/x-portable-pixmap            binary  1.0 # PBM Pixmap
AddType  .rgb       image/x-rgb                        binary  1.0
AddType  .xbm       image/x-xbitmap                    ebcdic  1.0 # X bitmap
AddType  .xpm       image/x-xpixmap                    binary  1.0 # X pixmap format
AddType  .xwd       image/x-xwindowdump                binary  1.0 # X window dump
AddType  .html      text/html                          ebcdic  1.0 # HTML
AddType  .htm       text/html                          ebcdic  1.0 # HTML on PCs
AddType  .htmls     text/x-ssi-html                    ebcdic  1.0
AddType  .shtml     text/x-ssi-html                    ebcdic  1.0
AddType  .c         text/plain                         ebcdic  0.5 # C source
AddType  .h         text/plain                         ebcdic  0.5 # C headers
AddType  .C         text/plain                         ebcdic  0.5 # C++ source
AddType  .cc        text/plain                         ebcdic  0.5 # C++ source
AddType  .hh        text/plain                         ebcdic  0.5 # C++ headers
AddType  .java      text/plain                         ebcdic  0.5 # Java source
AddType  .m         text/plain                         ebcdic  0.5 # Objective-C src
AddType  .f90       text/plain                         ebcdic  0.5 # Fortran 90 src
AddType  .txt       text/plain                         ebcdic  0.5 # Plain text
# ***
# *   AddType directive added for InfoPrint Central
#*****************************************************************************
# AddType  .css      text/css                          8bit    1.0  # Style Sheets
# .css replaced by InfoPrint Central
AddType  .css       text/css                           ebcdic  1.0  # style sheets
AddType  .js        application/x-javascript           ebcdic  1.0  # JavaScript
AddType  .htc       text/x-component                   ebcdic  1.0  # .htc files
#*****************************************************************************
AddType  .rtx       text/richtext                      ebcdic  1.0 # MIME Richtext
AddType  .tsv       text/tab-separated-values          ebcdic  1.0
AddType  .etx       text/x-setext                      ebcdic  0.9 # Enchanced Txt
AddType  .MPG       video/mpeg                         binary  1.0 # MPEG
AddType  .mpg       video/mpeg                         binary  1.0
AddType  .MPE       video/mpeg                         binary  1.0
AddType  .mpe       video/mpeg                         binary  1.0
AddType  .MPEG      video/mpeg                         binary  1.0
AddType  .mpeg      video/mpeg                         binary  1.0
AddType  .qt        video/quicktime                    binary  1.0 # QuickTime
AddType  .mov       video/quicktime                    binary  1.0
AddType  .avi       video/x-msvideo                    binary  1.0 # MS Video
AddType  .movie     video/x-sgi-movie                  binary  1.0 # SGI moviepalyer
AddType  .zip       multipart/x-zip                    binary  1.0 # PKZIP
AddType  .Z         application/x-compress             gzip    1.0 # PKZIP
AddType  .gz        application/x-compress             gzip    1.0 # PKZIP
AddType  .tar       multipart/x-tar                    binary  1.0 # 4.3BSD tar
AddType  .ustar     multipart/x-ustar                  binary  1.0 # POSIX tar
AddType  *.*        www/unknown                        binary  0.2 # Try to guess
AddType  *          www/unknown                        binary  0.2 # Try to guess
AddType  .cxx       text/plain                         ebcdic  0.5 # C++
```

```
AddType   .for        text/plain                              ebcdic  0.5 # Fortran
AddType   .mar        text/plain                              ebcdic  0.5 # MACRO
AddType   .log        text/plain                              ebcdic  0.5 # logfiles
AddType   .com        text/plain                              ebcdic  0.5 # scripts
AddType   .sdml       text/plain                              ebcdic  0.5 # SDML
AddType   .list       text/plain                              ebcdic  0.5 # listfiles
AddType   .lst        text/plain                              ebcdic  0.5 # listfiles
AddType   .def        text/plain                              ebcdic  0.5 # definition file
AddType   .conf       text/plain                              ebcdic  0.5 # definition file
AddType   .           text/plain                              ebcdic  0.5 # files with no
#       The following could be used to store ASCII DBCS:
AddType   .JP932      text/x-DBCS                             binary  1.0 IBM-932  #
Japanese DBCS
AddType   .JPeuc      text/x-DBCS                             binary  1.0 IBMeucJP #
```

Infoprint Server and IBM Health Checker for z/OS

IBM Health Checker for z/OS provides a very useful framework into which IBM components can plug their product-specific checks. Health Checker for z/OS check routines look at an installation's configuration or environment to determine whether there are potential problems. A *check routine* is a program or routine that identifies potential problems before they impact your availability.

This appendix provides an example of an Infoprint Server check routine.

C.1 Infoprint Server health check

This check is performed after a CEEDUMP has been written below the base directory, or if the base directory or one or more files exceed a certain, predefined size.

Installing the health check routine

In this section we explain how to install the sample health check. These instructions assume that you are installing the checks on a system where the IBM Health Checker for z/OS is already active. Follow these steps:

1. Copy or save the contents of these files to a data set on a z/OS or z/OS.e. system.

2. Create a link list data set to save the modules to be created. (Optional)

3. Assemble and link edit each of the parts; they must be linked as reentrant:

   ```
   hzssamac
   hzssamck
   hzssammt
   ```

4. All of the modules must reside in an APF-authorized library in the link list. If the data set created in step 2 is not APF-authorized, then copy the modules into an APF-authorized library in the link list.

5. Refresh the link list data set:

   ```
   f lla,refresh
   ```

6. Add the check to the IBM Health Checker for z/OS using the hzsaddcheck dynamic exit routine, as follows:

   ```
        setprog exit,add,exitname=hzsaddcheck,module=hzssamac
   -d prog,exit,exitname=hzsaddcheck
   csv461i 13.16.30 prog,exit display 648
   exit            module   state module   state module   state
   hzsaddcheck     iarhcadc   a   igvhcadc   a   ilrhcadc   a
   hzsaddcheck     ieavtshi   a   ixchcadc   a   isghcadc   a
   hzsaddcheck     csvhcadc   a   idahcadd   a   igwhcpd1   a
   hzsaddcheck     cnzhcadc   a   irrhca00   a   ixghc1de   a
   hzsaddcheck     isthcac1   a   ezbhcac1   a   bpxhcadc   a
   ```

7. Run the exit routine to add the new checks:

   ```
   f hzsproc,addnew
   ```

8. Verify that the checks were added:

   ```
    check owner    check name
    ----------------        -----------------
    ibmsample  hzs_sample_one_time
    ibmsample  hzs_sample_interval
   ```

   If using SDSF, use the ck panel to display checks. Or, you can use a MODIFY command:

   ```
   f hzsproc,display,checks
   ```

C.2 Adding the health check

For a local check, you can use ADD | ADDREPLACE,CHECK, as shown in Figure C-1, to add or replace a check definition in an HZSPRMxx parmlib member. Define the check defaults and values directly in an HZSPRMxx parmlib member. You can use a MODIFY command to activate the check; for example:

```
F HZSPROC,ADD,PARMLIB=xx
```

```
ADD | ADDREPLACE,CHECK=(IBMAOP,AOP_HEALTH_CHECK)
               CHECKROUTINE=AOPCHECK,MESSAGETABLE=AOPHCMSG
               INTERVAL=0:15
               SEVERITY=LOW
               REASON=(This is a test check for Infoprint Server)
               DATE=20070824
               PARM=('PATH(/var/Printsrv/)','LIMIT(60G)','SIZE(400M)')
               VERBOSE=NO
               ENTRYCODE=1
               USS=YES
```

Figure C-1   Sample HZSPRMxx parmlib member statement

C.2.1 Sample check routine

A local check runs in the IBM Health Checker for z/OS address space; see Example C-1.

Example: C-1   Sample check routine

```
* START OF SPECIFICATIONS ****************************************
*
* MEMBER NAME:  AOPCHECK
*
* DESCRIPTIVE NAME:  SAMPLE HEALTH CHECK PROGRAM TO SHOW THE
*                    POSSIBILIES OF HEALTH CHECKER
*
* FUNCTION: RUN A CHECK ON BEHALF OF INFOPRINT SERVER.
*
*
* AOPCHECK
*      1 ENTRY FOR THE CHECK
*      2 +-SELECT FUNCTION CODE
*      3 +-WHEN INITIALIZE
*      4 | DO   NOTHING
*      5 +-WHEN CHECK
*      6 | CALL THE_CHECK
*      7 +-WHEN CLEANUP/DELETE
*      8 | DO   NOTHING
*      9 +-OTHERWISE
*     10 | DISPLAY AOP_HC_BAD_FUNCTION MESSAGE
*     11 +-ENDSELECT
*     12 RETURN
*     13 END
*
* ****************************************************************
*
```

```
* THE_CHECK
*     1   ENTRY - PERFORMS THE CHECK
*     2 +-IF NEW PARMS
*     3 |   CALL VALIDATE_PARMS
*     4 | +-IF PARM ERROR
*     5 | :   RETURN
*     6 | +-ENDIF
*     7 +-ENDIF
*     8   CHECK
*     9   END "THE_CHECK"
*
* THIS CHECK USES UNIX SYSTEM CALLABLE SERVICE IN ORDER TO
* READ A UNIX FILE SYSTEM
*
********************************************************************
*
* INPUT:
*
*      1) REGISTER O. ADDRESS OF 4K DYNAMIC WORK AREA
*         REGISTER 1. ADDRESS OF AN 8 BYTE PARAMETER LIST CONTAINING:
*                 +0 THE 4 BYTE ADDRESS OF THE HZSPQE FOR THE CHECK
*                 +4 THE 4 BYTE ADDRESS OF THE 4K DYNAMIC WORK AREA
*
*   ENTRY-REGISTERS:
*
*      REG  0 - ADDRESS OF THE 4K DYNAMIC WORK AREA
*      REG  1 - ADDRESS OF 8 BYTE PARAMETER LIST
*      REG 13 - ADDRESS OF A 144 BYTE SAVE AREA
*      REG 14 - RETURN ADDRESS.
*      REG 15 - ADDRESS OF THE CHECK ROUTINE
*
*   REGISTER USAGE:
*
*      REG  0 - WORK REGISTER
*      REG  1 - WORK REGISTER
*      REG  2 - ADDRESS OF THE HZSPQE FOR THE CHECK
*      REG  3 - Pointer to Directory entries
*      REG  4 - WORK REGISTER
*      REG  5 - WORK REGISTER
*      REG  6 - Count Of directory entries per buffer
*      REG  7 -
*      REG  8 -
*      REG  9 - ADDRESS OF FIRST 4K WORKAREA
*      REG 10 - ADDRESS OF CURRENT 4K WORKAREA
*      REG 12 - BASE ADDRESS
*      REG 13 -
*      REG 14 - LINKAGE REGISTER
*      REG 15 - WORK REGISTER
*
* RECOVERY-OPERATION:
*
*  THE IBM HEALTH CHECKER FOR Z/OS PROVIDES RECOVERY AROUND
*  CALLS. IF THE CHECK ROUTINE ABENDS WHILE PERFORMING
*  THE PQE_CHECK FUNCTION, THE IBM HEALTH CHECKER FOR Z/OS
*  WILL CALL WITH THE PQE_CLEANUP FUNCTION CODE.
```

```
*
*********************************************************************
*
* EXECUTION
*
*   MODE:          ENABLED
*   STATE:         PROBLEM
*   KEY:           8
*   AMODE:         31
*   LOCKS HELD:    NONE
*   ASCMODE:       PRIMARY
*   MEMORY MODE:   P=S=H
*   DISPATCH MODE: TASK
*   ADDRESS SPACE: HEALTH CHECKER
*
*******************************************************************
*
* NAME     MAPPING  USE  DESCRIPTION
* -------- -------- ---- ------------
* DIRE     BPXYDIRE  R   MAPPING OF DIRECTORY ENTRY
* STAT     BPXYSTAT  R   STAT SYSTEM CALL STRUCTURE
* S_MODE   BPXYMODE  R   MODE CONSTANTS SPECIFIED ON SYSCALLS
*          BPXYFTYP  R   FILE TYPE DEFINITIONS
* MGB      HZSMGB    R   HEALTHCHECKER MESSAGE BLOCK
* PQE      HZSPQE    R   HEALTHCHECKER PROCESS QUEUE ELEMENT
*
*******************************************************************
AOPCHECK TITLE  'INFOPRINT SERVER HEALTH CHECK'
AOPCHECK CSECT
AOPCHECK AMODE  31
AOPCHECK RMODE  31
         USING  AOPCHECK,R12
         SAVE   (14,12),,AOPCHECK_&SYSDATE
*
*********************************************************************
*
* THE CHECK ROUTINE IS NOT REQUIRED TO SAVE REGISTERS
*
*********************************************************************
*
         LR     R12,R15              set up base register
         USING  WORKAREA,R10
         LR     R10,R0               load addr of dyn. work area
         ST     R14,RETADDR          save return address
         L      R2,0(R1)             access PQE address
         USING  HZSPQE,R2
*
         CLC    PQE_Entry_Code,=F'1'  first check the entry code
         JNE    GETOUT                it identifies the check called
*
* Checks may get control for function codes
*
AOPK010  CLC    PQE_Function_Code,=A(PQE_Function_Code_Init)
         JNE    AOPK020
         TM     PQE_VERBOSE,PQE_VERBOSE_YES
```

```
          BC     ALLOFF,AOPK011
          LA     R1,AOPV001I
          WTO    MF=(E,(1))
AOPK011   B      GETOUT
*
* is called at the specified interval for the check
*
AOPK020   CLC    PQE_Function_Code,=A(PQE_Function_Code_Check)
          JNE    AOPK030
          TM     PQE_VERBOSE,PQE_VERBOSE_YES
          BC     ALLOFF,AOPK021
          LA     R1,AOPV002I
          WTO    MF=(E,(1))
*
AOPK021   SR     R1,R1
          ST     R1,PREV              clear the PREV pointer
          ST     R1,NEXT              clear the NEXT pointer
          MVC    ID(L'ID),=CL8'AOPCHECK' set eyecatcher
          ST     R1,SIZE_LO
          ST     R1,SIZE_HI           size must be zero
          LR     R9,R10               save first WORKAREA pointer
*
* Put out the input parameter list if VERBOSE = YES
*
          TM     PQE_VERBOSE,PQE_VERBOSE_YES
          BC     ALLOFF,START
          MVC    WTOPFLG,=X'0000'     clear the WTO flag bytes
          LH     R1,PQE_Parmlen       length of input parameter
          BCTR   R1,0                 Minus one for EXECUTE MVC
          EX     R1,MOVE              move them over
          LA     R1,4(0,R1)           add 4 for WTO
          ST     R1,WTOPLEN
          LA     R1,WTOPATH
          WTO    MF=(E,(1))
          B      START
MOVE      MVC    PATHBUF(0),PQE_ParmArea
MOVE1     MVC    PATHBUF(0),PPATHBUF
*
START     BAL    R14,PARMTEST         read input parameter
*
          L      R1,PPATHLEN
          ST     R1,PATHLEN           store the path len
          BCTR   R1,0                 Minus one for EXECUTE MVC
          EX     R1,MOVE1             move the input path
OPENDIR   CALL   BPX1OPD,             Open a directory              +
                 (PATHLEN,            Input: Directory name length  +
                 PATHBUF,             Input. Directory name         +
                 RETVAL,              Return -1 or Dir file descrip. +
                 RETCODE,             RETURN code                   +
                 RSNCODE),            REASON code                   +
                 VL,MF=(E,PLIST)
          SPACE ,
          ICM    R15,B'1111',RETVAL   Test RETVAL
* ERROR
          BM     CERROR
```

```
          ST    R15,DIRDESC              remember directory descriptor
*
READ      MVC   BUFLENA,=A(MAXBUFF)
          LA    R15,BUFFERA
          ST    R15,BUFA
          CALL  BPX1RDD,                 read entries from a directory   X
                (DIRDESC,                directory file descriptor       X
                BUFA,                    pointer to output buffer        X
                PRIMALET,                                                X
                BUFLENA,                 buffer size                     X
                RETVAL,                                                  X
                RETCODE,                                                 X
                RSNCODE),                                                X
                VL,MF=(E,PLIST)

          ICM   R15,B'1111',RETVAL       Test RETVAL
* ERROR
          BM    CERROR
          BZ    ENDDIR1                  RETVAL=0 means no more entries
*
          LR    R6,R15                   remember the amount of entries
          USING DIRE,R3
          LA    R3,BUFFERA               point to output area
          ICM   R1,B'1111',NEXT
          BNZ   NOGET


************************************************************************
* Obtained resources should be released when this check iteration     *
* ends. Usually, these would be resources owned by the current task   *
* so that if the current task unexpectedly terminates, the system     *
* would free the resource. If the system will not automatically free  *
* the resource on termination of this task, the Cleanup processing    *
* must free the resource.                                             *
************************************************************************

          STORAGE OBTAIN,                                                X
                LENGTH=WLENGTH,                                          X
                LOC=(ANY,ANY)

          ST    R1,NEXT                  save pointer in old buffer
          DROP  R10
          USING NEWAREA,R1
          MVC   ID(L'ID),=CL8'AOPCHECK' set eyecatcher
          ST    R10,PREV                 save the backward pointer
NOGET     LR    R10,R1                   point to new buffer
*
* Now, there are two buffers one for the DIR entries and one for
* the STAT entries which are read for each DIR entry
*
* Before the first file can be read, we have to move the directory
* path over to the new buffer.
*
          LA    R0,PATHBUF               Destination (new buffer)
          L     R1,PREV                  Address of old buffer
          L     R5,PATHLEN               path length from old path
```

```
             LA    R4,PATHBUF             Source (old buffer)
             LR    R1,R5                  R1 = R5 for MVCL
             LR    R8,R5                  remember the length
             MVCL  R0,R4                  copy the path over to the new
*                                         buffer
             LR    R7,R0                  remember this point
             CHI   R8,1                   don't add a slash if root
             JE    COUNT                  that is PATHLEN=1 for '/'
             MVC   0(1,R7),=CL1'/'        add a slash to the DIR
             LA    R8,1(0,R8)             add one for the slash
             LA    R7,1(0,R7)             add one
COUNT        LR    R0,R7                  store the append point
             LH    R5,DIRENTNAML          new length
             LR    R1,R5                  R1 = R5 for MVCL
             LA    R4,DIRENTNAME          entry name
             MVCL  R0,R4                  append the name to the path
*
             LH    R5,DIRENTNAML          length of the entry
             AR    R5,R8                  add to path lenght
             DROP  R1
             USING NEWAREA,R10
             ST    R5,PATHLEN             store the entire path length
*
* Throw an error once the PATHLEN exceeds the maximum allowed
*
             MVC   BUFLENA,=A(MAXBUFF)
             LA    R15,BUFFERA
             CALL  BPX1LST,                                           X
                   (PATHLEN,                                          X
                   PATHBUF,                                           X
                   BUFLENA,                                           X
                   BUFFERA,                                           X
                   RETVAL,                                            X
                   RETCODE,                                           X
                   RSNCODE),                                          X
                   VL,MF=(E,PLIST)
             ICM   R15,B'1111',RETVAL     Test RETVAL
* ERROR
             BM    CERROR
*
* Calculate the file size and all you have to do.
*
             TM    PQE_VERBOSE,PQE_VERBOSE_YES
             BC    ALLOFF,AOPK025
             MVC   WTOPFLG,=X'0000'
             L     R1,PATHLEN             display only the first 127 bytes
             N     R1,=X'0000007F'        of each file
             LA    R1,4(0,R1)             add 4 Bytes for the WTO flags
             ST    R1,WTOPLEN
             LA    R1,WTOPATH
             WTO   MF=(E,(1))
AOPK025      CNOP  0,4
*
             LA    R4,BUFFERA
             USING STAT,R4
```

```
*
* Display the file if it is a CEEDUMP
*
COMPARE  CLC   DIRENTNAME(7),=CL7'CEEDUMP'
         BE    MSG01                   issue the full filname
*
* Display the file if file size is greater than SIZE(nnnnx)
*
         CLC   SIZE,ST_SIZE
         JH    SIZEOK
*
MSG01    MVC   LINE(L'LINE),=52X'40'
         CLC   PATHLEN,=A(53)
         JL    MOVE01
         LA    R14,PATHBUF
         L     R1,PATHLEN
         S     R1,=A(52)
         LA    R14,0(R1,R14)
         MVC   LINE(L'LINE),0(R14)
         MVC   LINE(2),=Cl2'..'
         B     MOVE02
EX04     MVC   LINE(0),PATHBUF
MOVE01   L     R1,PATHLEN
         BCTR  R1,0                    Minus one for EXECUTE
         EX    R1,EX04
*
MOVE02   LA    R1,MGBAREA
         ST    R1,MGBADDR
         Using HZSMGB1,R1
         MVC   MGB1_MessageNumber,=F'2'    Message with XREFTEXT=002
         MVC   MGB1_insert_cnt,=F'2'       two inserts
         DROP  R1
         PUSH  USING
         USING MGB1_MsgInsertDesc,INSERT1
         MVC   MGB1_MsgInsertDesc_Length(2),=AL2(L'LINE)
         LA    R1,LINE
         ST    R1,MGB1_MsgInsertDesc_Addr Insert the adress
         POP   USING
         PUSH  USING
         USING MGB1_MsgInsertDesc,INSERT2
         MVC   MGB1_MsgInsertDesc_Length,=AL2(L'ST_SIZE)
         LA    R1,ST_SIZE
         ST    R1,MGB1_MsgInsertDesc_Addr Insert the adress
         POP   USING
*
         HZSFMSG REQUEST=CHECKMSG,MGBADDR=MGBADDR,                  X
               MGBFORMAT=1,RETCODE=RETCODE,RSNCODE=RSNCODE,         X
               MF=(E,HZSFMSG_LIST)

         ICM   R15,B'1111',RETCODE     Test Return code
* ERROR
         BNZ   CERROR
*
SIZEOK   L     R1,ST_BLKSIZE           File Block size
         M     R0,ST_BLOCKS            Number of blocks allocated
```

```
         DROP  R10
         USING NEWAREA,R9
         AL    R1,SIZE_LO            Add low order word
         ALC   R0,SIZE_HI           Add high order word
         ST    R1,SIZE_LO           store new low order word
         ST    R0,SIZE_HI           store new high order word
         DROP  R9
         USING NEWAREA,R10
*
         LA    R4,ST_MODE
         USING S_MODE,R4
         CLI   S_TYPE,FT_DIR        is it a directory ?
         BNE   CONTO1               No. Continue
*
         CLC   DIRENTNAME(1),=C'.'  starts with a dot ?
         BE    CONTO1               Yes, continue
*
* This entry is not a file but a new directory. Go open it.
*
         STM   R2,R12,REGS          save regs of this level
         B     OPENDIR
*
CONTO1   AH    R3,DIRENTLEN
         L     R1,=X'00040000'      load end marker
         C     R1,0(0,R3)           last entry ?
         BE    ENDDIR

         BCT   R6,COUNT             continue till R6=0, that is
*                                   all entries processed
         ICM   R10,B'1111',PREV     go back to prev. buf. for read
         B     READ                 R6 = 0, read next DIR buffer
*
ENDDIR   ICM   R10,B'1111',PREV     get previous buffer
* ERROR
         BZ    GETOUT               a buffer is missing
*
ENDDIR1  CALL  BPX1CLD,             Close a directory             +
               (DIRDESC,            Input: Directory file descript. +
               RETVAL,              Return -1 or 0                +
               RETCODE,             RETURN code                   +
               RSNCODE),            REASON code                   +
               VL,MF=(E,PLIST)
*
         ICM   R15,B'1111',RETVAL   Test RETVAL
* ERROR
         BM    CERROR
         ICM   R1,B'1111',NEXT
         STORAGE RELEASE,                                         X
               ADDR=(R1),                                         X
               LENGTH=WLENGTH
*
         ICM   R1,B'1111',PREV      back on first level ??
         BZ    FINISH               YES, finish (end)
         SR    R1,R1
         ST    R1,NEXT              clear next pointer
```

```
          LM    R2,R12,REGS            reload old registers
          B     CONT01
*
* final processing
* check the size limit of the file system against LIMIT(nnnn)
*
FINISH    CLC   LIMIT,SYSSIZE
          JH    GETOUT
          LA    R1,MGBAREA
          ST    R1,MGBADDR
          Using HZSMGB1,R1
          MVC   MGB1_MessageNumber,=F'1'   Message with XREFTEXT=001
          MVC   MGB1_insert_cnt,=F'1'      two inserts
          DROP  R1
          PUSH  USING
          USING MGB1_MsgInsertDesc,INSERT1
          MVC   MGB1_MsgInsertDesc_Length,=AL2(L'SYSSIZE)
          LA    R1,SYSSIZE
          ST    R1,MGB1_MsgInsertDesc_Addr Insert the adress
          POP   USING
*
          HZSFMSG REQUEST=CHECKMSG,MGBADDR=MGBADDR,                    X
                MGBFORMAT=1,RETCODE=RETCODE,RSNCODE=RSNCODE,           X
                MF=(E,HZSFMSG_LIST)
*
          ICM   R15,B'1111',RETVAL     Test RETVAL
* ERROR
          BM    CERROR
          B     GETOUT                 READY and OUT
          DROP  R10


*******************************************************************
*
* Subroutine to check Parameters
* All parameter must follow this syntax rule
* PARM=('PATH(/var/Printsrv)','LIMIT(nnnnK)','SIZE(nnnnM)')
*
* nnnn = 0 - 9999 ( k / M / G / T ) Bytes
*
* The INPUT path must not exceed 128 Bytes !
*
* working register R0, R1, R3, R4, R5 and R15
* results are stored into the first workarea pointed to by R9
* PATH() - is the directory of the file system being checked
* LIMIT()- is the size limit of the file system
* SIZE() - is the size limit of each file in the file system
*
* Entry Point : PARMTEST
*******************************************************************
*
*         USING WORKAREA,R9
PARMTEST  TM    PQE_MoreFlags,PQE_LookAtParms
          JZ    PARMEND
*
* Check that the 1. parameter begins with "PATH("
```

```
*
          CLC    PQE_ParmArea(5),=CL5'PATH('
          JNE    PERROR
          LA     R1,PQE_PArmArea+5        point path name
          LR     R15,R1                   remember that position
          LA     R3,PPATHBUF
MORE      CLI    0(R1),C'/'               at the end ?
          BE     P1END                    let see if folloed by ')'
NOTEND    MVC    0(1,R3),0(R1)            copy next character
          LA     R1,1(R1)                 next character
          LA     R3,1(R3)                 next character
          CLI    0(R1),C')'               at the real end ?
          BE     P1END1
          B      MORE
P1END     CLI    1(R1),C')'               at the real end ?
          BNE    NOTEND
          SR     R1,R15                   calculate path length
          BZ     PERROR                   zero path length
          LA     R15,1(R15)               add one byte because '/'
          J      P1END2
P1END1    SR     R1,R15                   calculate path lenght
          BZ     PERROR                   zero path length
P1END2    CHI    R1,127                   path must be less than 128
          BH     PERROR
          ST     R1,PPATHLEN
          LA     R1,2(R1,R15)             pathlen), = pathlen + 2
*
* Check that the 2. parameter begins with "LIMIT("
*
          CLC    0(6,R1),=CL6'LIMIT('
          JNE    PERROR
          LA     R1,6(R1)                 point to first number
          LR     R15,R1                   remember that position
          BAL    R5,TRANS                 translate to binary
          ST     R0,LIMITH
          ST     R1,LIMITL
*
* Check that the 3. parameter begins with "SIZE("
*
          LA     R15,2(R15)               point behind the 2. parm
          LR     R1,R15                   restore position
          CLC    0(5,R1),=CL5'SIZE('
          JNE    PERROR
          LA     R1,5(R1)                 point to first number
          LR     R15,R1                   remember that position
          BAL    R5,TRANS                 translate to binary
          ST     R0,SIZEH
          ST     R1,SIZEL

PARMEND   BR     R14
*
* Suproutine to translate a number to binary
*
TRANS     LA     R3,INPUT
TRANS1    CLI    0(R1),C'9'               keine Zahl
```

```
           BH    PERROR                 yes, escape the loop
           CLI   0(R1),C'0'             keine Zahl
           BL    PAEND                  yes, escape the loop
           MVC   0(1,R3),0(R1)          move to input
           LA    R1,1(R1)               next position
           LA    R3,1(R3)               next position
           B     TRANS1
PAEND      ST    R1,POS1                remember current position
           SR    R1,R15                 how many numbers ?
           BZ    PERROR                 must be at least one
           CHI   R1,4                   more than 4 numbers not allowed
           BH    PERROR
           L     R0,=CL4'0000'          load prefix
           ST    R0,PREFIX
           LA    R0,PREFIX
           AR    R1,R0
           PACK  WORK(8),0(4,R1)
           CVB   R1,WORK                convert to binary
           SR    R0,R0
           L     R15,POS1               restore position
           CLI   0(R15),C')'            Bytes ?
           BE    RET
           CLI   0(R15),C'K'            Kilo bytes ?
           BE    PKILO
           CLI   0(R15),C'M'            Mega Bytes ?
           BE    PMEGA
           CLI   0(R15),C'G'            Giga Bytes ?
           BE    PGIGA
           CLI   0(R15),C'T'            Tera Bytes ?
           BE    PTERA
           B     PERROR                 syntax error
PTERA      SLDL  R0,10(0)               multiply by 1024
PGIGA      SLDL  R0,10(0)               multiply by 1024
PMEGA      SLDL  R0,10(0)               multiply by 1024
PKILO      SLDL  R0,10(0)               multiply by 1024
           LA    R15,1(R15)             move one position further
RET        BR    R5
           USING WORKAREA,R10
PERROR     HZSFMSG REQUEST=STOP,REASON=BADPARM,                          X
              MF=(E,HZSFMSG_LIST)
           B     GETOUT
*
* is called right after the check function
*
AOPK030    CLC   PQE_Function_Code,=A(PQE_Function_Code_Cleanup)
           JNE   AOPK040
           TM    PQE_VERBOSE,PQE_VERBOSE_YES
           BC    ALLOFF,AOPK031
           LA    R1,AOPV003I
           WTO   MF=(E,(1))
AOPK031    B     GETOUT
*
* is called once at the end of the life of the check
*
AOPK040    CLC   PQE_Function_Code,=A(PQE_Function_Code_Delete)
```

```
              JNE    GETOUT
              TM     PQE_VERBOSE,PQE_VERBOSE_YES
              BC     ALLOFF,AOPK041
              LA     R1,AOPV004I
              WTO    MF=(E,(1))
AOPK041   B      GETOUT
*
CERROR    HZSFMSG REQUEST=HZSMSG,REASON=ERROR,DIAG=RETCODE,           X
              MF=(E,HZSFMSG_LIST)
*
GETOUT    L      R14,RETADDR
              BR     R14
*
STATAREA DS     0D              STATIC AREA
              LTORG                 LITERALS
AOPV001I WTO    'AOPV001I Entry of PQE_Function_Code_Init',MF=L
AOPV002I WTO    'AOPV002I Entry of PQE_Function_Code_Check',MF=L
AOPV003I WTO    'AOPV003I Entry of PQE_Function_Code_Cleanup',MF=L
AOPV004I WTO    'AOPV004I Entry of PQE_Function_Code_Delete',MF=L
*
PRIMALET DC     A(0)            Primary ALET
*
*********************************************************************
*         DATA AREAS                                                *
*********************************************************************
              BPXYSTAT ,
              BPXYMODE ,
              BPXYFTYP ,
              BPXYDIRE ,
              HZSMGB ,
              HZSPQE ,
*
*  Retained Working Area Map - This maps the area provided by the
*  IBM Health Checker for z/OS in field PqeChkWork. The values
*  placed into this area are retained from call to call.
*  Thus the name Retained.
*
HZSPQE    DSECT                        Within HZSPQE
              ORG    PQECHKWORK         Persistent Data (x'800' bytes)
PARM      DS     0D
LIMIT     DS     0D
LIMITH    DS     F
LIMITL    DS     F
SIZE      DS     0D
SIZEH     DS     F
SIZEL     DS     F
SYSSIZE   DS     0D
SIZE_HI   DS     F
SIZE_LO   DS     F
*
WORK      DS     XL8 packed decimal
POS1      DS     CL4
PREFIX    DS     CL4
INPUT     DS     CL4
PPATHLEN DS     F                      The Pathlen value
```

```
PPATHBUF DS     CL128                     input path is limited by 128
PARM_LEN EQU    *-PARM
*
* ROOM FOR 4096 BYTES USING THE INPUT AREA IN REGISTER 0
*
WORKAREA DSECT
OLDAREA  DS     0F
NEWAREA  DS     0F
PREV     DS     F
NEXT     DS     F
ID       DS     CL8                       Room for eyecatcher
REGS     DS     CL72
LINE     DS     CL52
*
DIRDESC  DS     F
RETVAL   DS     F
RETCODE  DS     F
RSNCODE  DS     F
PLIST    DS     8F                        PLIST for USS calls
RETADDR  DS     A
MGBADDR  DS     A
MGBAREA  DS     CL(HZSMGB1_LEN)
INSERT1  DS     CL(MGB1_MsgInsertDesc_Len)   Area for first Insert
INSERT2  DS     CL(MGB1_MsgInsertDesc_Len)   Area for second Insert
         HZSFMSG MF=(L,HZSFMSG_LIST),                              +
               PLISTVER=MAX
BUFA     DS     F
PATHLEN  DS     F
* keep the next 5 definitions together
WTOPLEN  DS     0F                        WTO length field
GAB      DS     H
WTOPATH  DS     H                         WTO length
WTOPFLG  DS     H                         WTO flags
PATHBUF  DS     CL512                     max. USS path length
BUFLENA  DS     F
LENGTH   EQU    *-WORKAREA
BUFFERA  DS     CL(4096-LENGTH)           Buffer
MAXBUFF  EQU    *-BUFFERA
WLENGTH  EQU    *-WORKAREA                Workare length 4kByte
**********************************************************************
*        GENERAL PURPOSE REGISTERS                                  *
**********************************************************************
         YREGS
**********************************************************************
*        AFTER TEST UNDER MASK INSTRUCTIONS                         *
**********************************************************************
ALLON    EQU    1               ALL ON
MIXED    EQU    4               MIXED
NALLOFF  EQU    5               ALLON+MIXED
ALLOFF   EQU    8               ALL OFF
NALLON   EQU    12              ALLOFF+MIXED
         END
```

Sample JCL to assemble check routine

Example C-2 shows sample JCL used to assemble and link the check routine.

Example: C-2   Sample JCL to assemble and link the check routine

```
//        JOB ...
//LIB     JCLLIB ORDER=ASM.SASMSAM1
//*
//ASM     EXEC PROC=ASMACL,
//          PARM.C='OBJ',
//          PARM.L='LIST,RENT,REUS,MAP,AC=0'
//C.SYSLIB  DD DSN=SYS1.MODGEN,DISP=SHR
//          DD DSN=SYS1.MACLIB,DISP=SHR
//          DD DSN=SYS1.AMODGEN,DISP=SHR
//L.SYSLIB  DD DISP=SHR,DSN=SYS1.CSSLIB
//L.SYSLMOD DD DISP=SHR,DSN= ???
//C.SYSIN   DD DISP=SHR,DSN= ???
```

The message table defines the check output messages issued by the check routine. Example C-3 displays a complete check message data set.

You need to generate the messages from the message input data set into a compiled assembler CSECT using the message generation exec HZSMSGEN. Sample JCL is contained in SYS1.SAMPLIB.

C.2.2 Sample message table

Example: C-3   Sample message table

```
<lines props="copyright" id="KGOETZE">
*     SAMPLE ASSEMBLER COMMENT FOR  COPYRIGHT
</lines>
<msglist xreftext="AOPCHECK">
<!--  ================================================================  -->
<!--  MESSAGE  AOPK001I                                                 -->
<!--  ================================================================  -->
<msg class="Exception">
<msgnum xreftext="001">AOPK001I</msgnum>
<msgtext>
The &hzsckname; has found one or more
potential problems with the size of the file system.
<lines> </lines>
The filesystem, specified on the PATH statement, exceeds the specified
file size limit, specified on the LIMIT statement.
<lines> </lines>

Current filesystem size is <mv class=decimal>size</mv>
</msgtext>
<msgitem class="explanation">
<p>
The filesystem might run out of space !
Make sure that the file system has enough space.
</p></msgitem>
```

```
<msgitem class="sysact">
<p>
Processing continues.
</p></msgitem>
<msgitem class="oresp">
<p>
None.
</p></msgitem>
<msgitem class="spresp">
<p>
For information about how much space is required, see "Calculating
DASD space requirements Infoprint Server Customization, topic 3.5.2.1.
</p></msgitem>
<msgitem class="probd">
<p>
None.
</p></msgitem>
<msgitem class="source">
<p>
None.
</p></msgitem>
<msgitem class="refdoc">
<p>
None.
</p></msgitem>
<msgitem class="automation">
<p>
None.
</p></msgitem>
<msgitem class="module">
<p>
AOPCHECK
</p></msgitem>
<msgitem class="rcode">
<p>
</p></msgitem>
<msgitem class="dcode">
<p>
</p></msgitem>
</msg>
<!-- ===================================================================== -->
<!-- MESSAGE AOPK002I                                                       -->
<!-- ===================================================================== -->
<msg class="report">
<msgnum xreftext="002">AOPK002I</msgnum>
<msgtext>
Size of <mv class="nocompress"></mv>
is <mv class="decimal">size</mv>
</msgtext>
<msgitem class="explanation">
<p>
Header line for the Infoprint Server check.
</p></msgitem>
<msgitem class="sysact">
<p>
```

```
Processing continues.
</p></msgitem>
<msgitem class="oresp">
<p>
None.
</p></msgitem>
<msgitem class="spresp">
<p>
None.
</p></msgitem>
<msgitem class="probd">
<p>
None.
</p></msgitem>
<msgitem class="source">
<p>
None.
</p></msgitem>
<msgitem class="refdoc">
<p>
None.
</p></msgitem>
<msgitem class="automation">
<p>
None.
</p></msgitem>
<msgitem class="module">
<p>
AOPTEST
</p></msgitem>
<msgitem class="rcode">
<p>
</p></msgitem>
<msgitem class="dcode">
<p>
</p></msgitem>
</msg>
</msglist>
```

C.2.3 Sample JCL for message table

Example C-4 displays sample JCL used to convert and link a message table.

Example: C-4   Sample JCL to convert and link the message table

```
//         JOB ...
//CONV    EXEC PGM=IKJEFT01,REGION=32M,PARM='%HZSMSGEN NLSCHECK(N)'
//SYSTSPRT DD  SYSOUT=*
//SYSPROC  DD  DISP=SHR,DSN=SYS1.SBLSCLI0
//SYSTSIN  DD  DUMMY
//HZSADSN  DD  DSN=&&MOD,
//         DISP=(NEW,PASS),
//         SPACE=(32760,(15,15,1),RLSE),
//         DCB=(LRECL=80,BLKSIZE=32720,RECFM=FB,DSORG=PS)
```

```
//HZSSDSN  DD  DUMMY
//HZSMDSN  DD  DISP=SHR,DSN= ???
//**********************************************************
//CL       EXEC PROC=ASMACL,
//         PARM.L='LIST,RENT,REUS,MAP,AC=0'
//L.SYSLMOD  DD DISP=SHR,DSN= ???
//C.SYSIN    DD DSN=&&MOD,DISP=(SHR,DELETE)
```

D

View the common message log tool

The common message log tool is a REXX program started under ISPF that brings up a panel where you can enter all the information needed to select messages from the message log. It is useful when additional search keywords can be entered, because it allows you to limit the number of messages to only those belonging to a certain user or printer.

D.1 REXX program to view common message log

This tool consists of three parts: an ISPF panel, an ISPF macro, and a REXX program. All three parts must be installed into the appropriate system libraries.

D.2 The ISPF panel

The ISPF panel is the interface to the user, and it determines what values can be entered; see Example D-1. This panel will also fill in a default for the begin time value.

Example: D-1   Panel for the message log browse tool

```
)ATTR
 ~ type(input)  intens(high) color(yellow) just(left) caps(off)
 $ type(text)   intens(high) color(yellow)
 Ä type(text)   intens(high) color(turq)
 } type(output) intens(high) color(pink)
 { type(output) intens(high) color(turq)  just(left)
 # type(output) intens(high) color(yellow) just(left)
 @ type(output) intens(high) color(yellow) just(right)
)BODY lmsg(lmsg) WINDOW(59,16)
%---------- Infoprint Common Message Log Browse ----------
% Cmd$==>_ZCMD
{lmsg
$SelectÄtime interval$orÄLast$minutes:
%            Year Mo Da Ho Mi@tz Ähours off from UTC   %
 ÄBegin  $==>_Z   _Z _Z _Z _Z Ä year month day hour minute
 ÄEnd    $==>_Z   _Z _Z _Z _Z Ä year month day hour minute
 $ -or-
ÄLast   $==>_Z   Ä             minutes
  $Note:ÄBegin$andÄEnd$times ignored whenÄLast$filled.
$
 ÄUser   $==>~UID    Ä        User ID filter
 ÄChars  $==>~CHARS          Ä Select with characters
$
)INIT
  .ZVARS = '( BY BMO BD BH BMI EY EMO ED EH EMI MR)'
  IF (&FT NE '98')
    &BY       = &ZSTDYEAR
    &BMO      = &ZMONTH
    &BD       = &ZDAY
    &BH       = TRUNC (&ZTIME, ':')
    &BMI      = .TRAIL
    &EY       = '    '
    &EMO      = '  '
    &ED       = '  '
    &EH       = '  '
&EMI      = '  '
    &MR       = '    '
    &UID      = '   '
    &CHARS    = '     '
  &FT = '98'
  .CURSOR  = BH
```

```
/*)REINIT                                    */
/*  REFRESH   ( EY EMO ED EH EMI BY BMO )    */
)PROC
&ZEDSMSG = ' '
IF (&MR = ' ')
  &ZEDLMSG = 'Value must be numeric'
  IF (&BMI NE ' ') VER(&BMI,NB,NUM,MSG=ISRZ001)
  ELSE
    &BMI = '00'
  IF (&BH  NE ' ') VER(&BH,NB,NUM,MSG=ISRZ001)
  IF (&BD NE ' ')  VER(&BD,NB,NUM,MSG=ISRZ001)
  IF (&BMO NE ' ') VER(&BMO,NB,NUM,MSG=ISRZ001)
  IF (&BY NE ' ')  VER(&BY,NB,NUM,MSG=ISRZ001)
  IF (&EMI NE ' ') VER(&EMI,NB,NUM,MSG=ISRZ001)
  IF (&EH  NE ' ') VER(&EH,NB,NUM,MSG=ISRZ001)
  IF (&ED NE ' ')  VER(&ED,NB,NUM,MSG=ISRZ001)
  IF (&EMO NE ' ') VER(&EMO,NB,NUM,MSG=ISRZ001)
  IF (&EY NE ' ')  VER(&EY,NB,NUM,MSG=ISRZ001)
ELSE
  &ZEDLMSG = 'Last minutes must be numeric'
VER(&MR,NB,NUM,MSG=ISRZ001)
)END
```

D.3 ISPF EDIT macro

The ISPF EDIT macro is a very easy and effective way either to include information that you want to see, or exclude information that you do want not to see. The source code for the sample is shown in Example D-2.

Example: D-2   ISPF EDIT macro

```
/* REXX */
address "ISREDIT"
"MACRO "
address "ISPEXEC" "VGET (UID CHARS) SHARED"
"AUTOSAVE ON"
if uid <> "" then ,
  "EXCLUDE 'user:"uid"' ALL"
if chars <> "" then ,
  "EXCLUDE '"chars"' ALL"
"DELETE ALL NX"
"RESET"
"(VAR) = LINENUM .ZLAST"
if var = 0 then do
  zedsmsg = ""
  zedlmsg = "AOPLGBR - Nothing left to show after filtering!"
  address "ISPEXEC" "SETMSG MSG(ISRZ001)"
  "CANCEL"
end
exit
```

D.4 REXX program

The REXX program reads /etc/profile to determine the current TZ environment variable, and it displays either all messages it finds, or STDER (if there is an error). It uses AOPBATCH to establish a UNIX System Service environment.

Example: D-3   REXX program

```
/* rexx */
parse arg aa
/* turn on tracing if requested */
z = wordpos("TRC",translate(aa))
if z ^= 0 then do
  Trace "I"
  aa = delword(aa,z,1)
end
else Trace "O"
/*******************************/
address "TSO"
rc = 24
aoprc = 32
if  aa = "?" | aa = "-?" | translate(aa) = abbrev("HELP",1) then
do
  x = sayit("Browse Infoprint Common Message Log under ISPF")
  exit 16
end
If sysvar(SYSISPF) <> "ACTIVE" then do
  x = sayit("Browse Infoprint Common Message Log works only under ISPF")
  exit 16
end
/* */
ADDRESS "ISPEXEC"  "LIBDEF ISPPLIB DATASET ID('KGOE.TOOLS.PLIB')"
disprc = 0
numeric digits 12
/* TZ */
 cvt = c2x( storage(10,4) )
 cvt_130 = d2x( x2d(cvt) + x2d(130) )
 numeric digits 32
 tz  = c2x( storage(cvt_130,4) )
 if substr(tz,1,1) = 'F' then do
   tz = d2x(4294967296 - (x2d(tz)))
   sg = "-"
 end
 else sg = "+"
 tz = sg || (x2d(tz)*1.0486)%3600
/*********************************/
do while disprc = 0
  ADDRESS "ISPEXEC"
  "ADDPOP  ROW(3)   COLUMN(4) "
  "DISPLAY PANEL(AOP0001)"
  disprc = rc
   "REMPOP"
  BT = ' '
  if BMI= ' ' then BT = '00'
              else BT = BMI
```

```
                    if BH <> ' ' then do
                       BT = BH':'BT
                       if BD <> ' ' then do
                          BT = BD':'BT
                          if BMO <> ' ' then do
                             BT = BMO':'BT
                             if BY <> ' ' then BT = BY':'BT
                          end
                       end
                    end
                    ET = ' '
                    if EMI <> ' ' then do
                       ET = EMI
                       if EH <> ' ' then do
                          ET = EH':'ET
                          if ED <> ' ' then do
                             ET = ED':'ET
                             if EMO <> ' ' then do
                                ET = EMO':'ET
                                if EY <> ' ' then ET = EY':'ET
                             end
                          end
                       end
                    end
                    if disprc = 0 then do
                    if MR <> ' ' then qual = '-l' MR
                                 else do
                                        qual = '-b' BT
                                        if ET <> ' ' then qual = qual '-e' ET
                                        end
                    address "ISPEXEC" "VPUT (UID CHARS) SHARED"
                    if uid = "" & chars = "" then view = 'N'
                                            else view = 'Y'
                    address "TSO"
                    /*-------------------------------------------------------------------
                       AOPPRINT - OS/390 Print Server foreground print procedure
                     *-----------------------------------------------------------------*/
                    z = outtrap("OF.")
                    "alloc dd(STDOUT) spa(2 9) tra new reu"
                    trc = rc
                    "alloc dd(STDERR) spa(1 4) tra new reu"
                    rc = max(rc,trc)
                    "alloc dd(STDIN)  spa(1)    tra new reu recf(f) lrec(80) dsor(ps)"
                    rc = max(rc,trc)
                    "alloc dd(STDENV) spa(1)    tra new reu recf(f) lrec(80) dsor(ps)"
                    rc = max(rc,trc)
                    z = outtrap("OFF")
                    /* STDENV may point to a dataset containing environment variables.
                     *        Builtin values will work for the default installation. */
                    if rc = 0 then do
                    if etctz = "" then do
                       etctz = "GMT0"                /* Find current TZ */
                       /*"alloc dd(ETC) PATH('/etc/profile') PATHOPTS(ORDONLY) reu"*/
                       "alloc dd(ETC) PATH('/etc/profile') PATHOPTS(ORDONLY)"
                       arc = rc
```

```
        "EXECIO * DISKR ETC ( STEM ETC. FINIS "
         erc = rc
         do i = 1 to etc.0
            if pos('TZ=',etc.i) <> 0 then do
            z = strip(etc.i,"B")
            z = translate(z,' ','15'x)
            parse var z 'TZ=' etctz ' ' .
            leave
         end
       end
       "unalloc dd(ETC)"
    end
    /* */
    acmd = 'aoplogu' qual
    /* Set TZ into environment */
    tzi.0 = 1
    tzi.1 = 'TZ='etctz
    "EXECIO * DISKW STDENV (STEM TZI. FINIS "
    /* Set command to execute for AOPBATCH */
    acmd.0 = 1
    acmd.1 = acmd
    "EXECIO * DISKW STDIN (STEM ACMD. FINIS "
    parm = "sh"
    z = time(r)
    address "LINKMVS" "AOPBATCH  parm "
    aoprc = rc
    z = time(r)
    if aoprc = 0 then ddn = "STDOUT"
                 else ddn = "STDERR"
    /*-----------------------------------------------------------------
       Tell aopprint  results...
    *----------------------------------------------------------------*/
    x = sayit(acmd "AOP_RC" aoprc "("z")")
    If sysvar(SYSISPF) = "ACTIVE" then do
      address "ISPEXEC" "CONTROL ERRORS RETURN"
      address "ISPEXEC" "LMINIT DATAID(DID) DDNAME("ddn")"
      if rc = 0 then do
        if view = 'Y' then
          address "ISPEXEC" "EDIT   DATAID("DID") MACRO(AOPLOG01) "
        else ,
          address "ISPEXEC" "BROWSE DATAID("DID")"
          address "ISPEXEC" "LMFREE DATAID("DID")"
        end
      end
    end
    else x = sayit(of.1)
      src = rc
      z = msg("OFF")
      "unalloc dd(STDOUT)"
      "unalloc dd(STDERR)"
      z = msg(z)
      rc = src
    end
  end
ADDRESS "ISPEXEC"  "LIBDEF ISPPLIB"
```

```
exit
sayit:
parse arg xyz
if xyz ^= "" then zedlmsg = xyz
If sysvar(SYSISPF) = "ACTIVE" then do
  zedsmsg = ""
  address "ISPEXEC" "SETMSG MSG(ISRZ000)"
end
else do
     if length(zedlmsg) > 115 then do
        do while zedlmsg <> ""
           zz = substr(zedlmsg,1,115)
           z = lastpos(" ",zz)
           if z = 0 then z = 115
           say  strip(substr(zedlmsg,1,z),'T')
           zedlmsg = substr(zedlmsg,z+1)
        end
     end
     else say zedlmsg
end
return 0
```

Related publications

The publications listed in this section are considered particularly suitable for a more detailed discussion of the topics covered in this book.

IBM Redbooks

For information about ordering these publications, see "How to get Redbooks" on page 202. Note that some of the documents referenced here may be available in softcopy only.

- *ABCs of z/OS System Programming Volume 7*, SG24-6987
- *z/OS Infoprint Server Implementation*, SG24-6234
- *Infoprint Server for z/OS Infoprint transforms*, SG24-7498

Other publications

These publications are also relevant as further information sources:

- *z/OS UNIX System Services Planning*, GA22-7800
- *z/OS MVS System Management Facilities (SMF)*, SA22-7630
- *z/OS Support for Unicode: Using Unicode Services*, SA22-7649
- *Character Data Representation Architecture Reference and Registry*, SC09-2190
- *z/OS XL C/C++ Programming Guide*, SC09-4765
- *z/OS Communications Server: IP Configuration Reference*, SC31-8776
- *z/OS HTTP Server Planning, Installing, and Using*, SC34-4826

Online resources

These Web sites are also relevant as further information sources:

After the HTTP server has been started you should be able to log on to Infoprint Central. To log on to Infoprint Central, enter a URL in the browser:

- For the English version:

  http://hostname:port/Infoprint/En_US/IPS.html

  If the HTTP Server uses Secure Sockets Layer (SSL):

  https://hostname:port/Infoprint/En_US/IPS.html

- For the Japanese version:

  http://hostname:port/Infoprint/Ja_JP/IPS.html

  If the HTTP Server uses Secure Sockets Layer (SSL):

  https://hostname:port/Infoprint/Ja_JP/IPS.html

How to get Redbooks

You can search for, view, or download Redbooks, Redpapers, Technotes, draft publications and Additional materials, as well as order hardcopy Redbooks, at this Web site:

ibm.com/redbooks

Help from IBM

IBM Support and downloads

ibm.com/support

IBM Global Services

ibm.com/services

Index

IBM Infoprint Server for z/OS Implementation Planning

Basic to extended mode migration, HTTP server

Sample tools for customization

ICONV customization

This IBM Redbooks publication provides installation and customization information and samples to help you implement IBM Infoprint Server for z/OS. Infoprint Server is an optional feature of z/OS that uses z/OS UNIX System Services. This feature is the basis for a total print serving solution for the z/OS environment. It lets you consolidate your print workload from many servers onto a central z/OS print server.

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

The following topics are described:
- ► Migrating from basic mode to extended mode
- ► Configuring an HTTP server for Infoprint Central
- ► Coordinating settings in JES, OMVS, TCP/IP, and the Printer Inventory using a cross-reference tool, with documentation
- ► Viewing messages in aoplogu using sample AOPBATCH JCL
- ► Monitoring and cleaning up CEEDUMP file using a sample tool
- ► Customizing the ICONV tables for custom code-page creation