IBM Print Software:
Hints, Tips and Short Subjects

Useful Gems for Infoprint Server, Transforms, PSF and ACIF

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Back Up that Printer Inventory!

- The Infoprint Server Printer Inventory keeps all of the printer definitions
- If there is a problem with Infoprint Server or it’s communication with JES, the Inventory can be corrupted
  - The effect of the corrupted Inventory may not be immediately obvious
- Even if you back up the Unix file system that contains the Inventory (/var/Printsrv), you may have saved a bad inventory
  - When Support suggests restoring the Inventory you may be restoring a corrupted version
  - A separate backup of the Inventory will allow you to get Infoprint Server up quickly and painlessly.
Back Up that Printer Inventory!

You can back up the Inventory using the Infoprint Server PIDU command

- PIDU (Printer Inventory Definition Utility) is the inventory maintenance utility
- PIDU will create a text version of the Inventory
- The PIDU command can be run daily as a scheduled job
  - in batch from JCL (recommended)
  - or as a cron job in Unix
- See Chapter 19. Using the PIDU program to manage the Printer Inventory in the Infoprint Server Operation and Administration book, S544-5745
Back Up that Printer Inventory!

From Batch:

```
//AOPPIDU JOB ...
//PIDU EXEC PGM=AOPBATCH,PARM='pidu'
//STDIN DD *
    export "'HOWARDT.PIDU.GDG(+1)'";
//STDOUT DD SYSOUT=* 
//STDERR DD SYSOUT=* 
//STDENV DD *
    PATH=/usr/mylib/Printsrv/bin 
    LIBPATH=/usr/mylib/Printsrv/lib 
    NLSPATH=/usr/mylib/Printsrv/%L/%N:/usr/mylib/ 
    Printsrv/En_US/%N 
/*
```

From Unix command line;

```
pidu -c " export inventory.export ; "
```

Do it...Level 2 will thank you!
Infoprint Server 1.13
Enhanced e-mail support

- You can now use Printway extended mode to:
  - Include text and line-data documents inline in the body of an e-mail, so that they can be read without opening an e-mail attachment.
  - Specify the e-mail recipients in an e-mail header in line-data documents without modifying JCL or printer definitions, using a subset of RFC 2822-compliant email headers.
  - Include a standard message in the beginning of each e-mail to specific recipients, such as a standard greeting and introductory paragraph.
  - Send different documents from a single print job to different e-mail recipients using e-mail headers, job attributes, or JCL.
Email addresses included in the message:

Email Job JCL

```
//EMAIL13A EXEC PGM=IEBGENER,REGION=1M
//SYSPRINT DD SYSOUT=A
//SYSIN DD DUMMY
//OUTEM OUTPUT CLASS=E,DEST=MAIL13A
//SYSUT2 DD SYSOUT=(,),OUTPUT=*.OUTEM
//SYSUT1 DD *
```

To: howard.turetzky@ricoh-usa.com
CC: howard.turetzky@infoprint.com
From: howardt@bldpdevn.bldev.infoprint.com
Subject: Testing email with embedded address

Dear Sir or Madam:

Blah, blah, blah...

/*

Printer Definition Source

```
create printer eml3a
    printer-codepage = IBM-1047
    print-page-header = no
    filters = {
        text -> aopfiltr.so
    }
    printer-type = ip-printway
    protocol-type = email
    description = "inline message with addr + inline text"
    destination = MAIL13A
    output-class = E
    document-formats-supported ={
        line
    }
```

...
The Results

Text in Email

"howardt@bldpdevn.bldev.infoprint.com"
<HOWARDT@bldpdevn.bldev.infoprint.com>

02/03/2013 10:19 PM

Default custom expiration date of 02/03/2014

Dear Sir or Madam:

The sun was shining on the sea,
Shining with all his might:
He did his very best to make
The billows smooth and bright--
And this was odd, because it was
The middle of the night

The moon was shining sulkily,
Because she thought the sun
Had got no business to be there
After the day was done--
"It's very rude of him," she said,
"To come and spoil the fun."

 Regards,
The Management
Email address in first file, PDF in second

**Email Job JCL**

//EMAIL13B EXEC PGM=IEBGENER,REGION=1M
//SYSPRINT DD SYSOUT=A
//SYSIN DD DUMMY
//OUTEM OUTPUT CLASS=E,DEST=MAIL13C
//SYSUT2 DD SYSOUT=(,),OUTPUT=*.OUTEM
//SYSUT1 DD *

To: howard.turetzky@ricoh-usa.com
CC: hydjm@earthlink.net
From: BigCo Mail Department
Subject: Testing email with embedded address

Dear Sir or Madam:
Blah, blah, blah...
/*
//EMAIL13B EXEC PGM=IEBGENER,REGION=1M
//SYSPRINT DD SYSOUT=A
//SYSIN DD DUMMY
//OUTEM OUTPUT CLASS=E,DEST=MAIL13C
//SYSUT2 DD SYSOUT=(,),OUTPUT=*.OUTEM
//SYSUT1 DD *
// DSN=HOWARDT.EMAIL.PDF,DISP=SHR

**Printer Definition Source**

create printer eml13c
  printer-codepage = IBM-1047
  print-page-header = no
  filters = {
    modca ->
      "afp2pdf.dll %filter-options"
    text -> aopfiltr.so
  }
  printer-type = ip-printway
  protocol-type = email
  ...
  document-formats-supported = {
    line
    modca
    pdf
  }
  ...
  mail-embedded-headers = yes
dcf-routing = yes
mail-reply-address = "me@ricoh-usa.com"
mail-to-addresses = {
  "bitbucket@ricoh-usa.com"
}
  automatic-dataset-grouping = yes
mail-from-name = "The Mail Department"
mail-inline-text = yes
Dear Sir or Madam:
   Page the First
   The sun was shining on the sea,
   Shining with all his might:
   He did his very best to make
   The billows smooth and bright--
   And this was odd, because it was
   The middle of the night

   The moon was shining sulkily,
   Because she thought the sun
   Had got no business to be there
   After the day was done--
   "It's very rude of him," she said,
   "To come and spoil the fun."

Regards,
The Management
The new AFP to PDF/PCL/PostScript™ transforms have new names to avoid confusion with the previous from AFP transforms.

Transforms naming scheme has changed, from AFP2P* to AFPXP*:
- Transform command: `afp2pdf` -> `afpxpdf`
- Transform DLL: `afp2ps.dll` -> `afpxps.dll`
- Transform classes: `afp2pcl_us` -> `afpxpcl_us`
- Transform daemon names: `afp2pdfd` -> `afpxpdfd`

Name change needs to be reflected in:
- `aopxfd.conf`
- Infoprint Server printer definitions that reference the transforms in their Processing section
  ```bash
  / MO:DCA-P afpxpdf.dll -c encrypt %filter-options (extend)
  ```
- AOPBATCH and AOPPRINT JCL
- Unix shell scripts
Easing migration of printer definitions

To save time for installations with many printer definitions, new shell script tool /usr/lpp/Printsrv/samples/aokmodfilter.sh can be used to modify their filter section.

Steps:

• 1. Run aokmodfilter.sh

```
> aokmodfilter.sh
Migrating afp2 filters to afpx
AOP065I 137 definitions were exported to /tmp/inventory.dump.
modify statements written to /tmp/filter.defs removing file /tmp/inventory.dump
```
Easing migration of printer definitions

• 2. Examine output in /tmp/filter.defs to verify that the modify commands are correct, and remove any you do not want changed.

```c
modify printer DUP0010_AFP2PCL filters={line -> "afpxpcl.dll -c us %filter-options" modca -> "afpxpcl.dll -c us %filter-options" text -> aopfiltr.so };
```

• 3. Use the `pidu` tool to modify the original printer definitions.

```bash
>pidu < /tmp/filter.defs
AOP063I printer DUP0010_AFP2PCL was replaced.
```
Using symbolic links to manage name change

- The transform command names are used by the AOPBATCH and AOPPRINT JCL and any Unix shell scripts that execute the transform, so these also need to change to point to the new transforms.

- Instead of editing each JCL file and Unix script that references the transform commands, you can use symbolic links.
To create a symbolic link from afp2pdf to afpxpdf, using the directory /usr/bin:

- Create a symbolic link from afp2pdf to /usr/lpp/Printsrv/bin/afpxpdf in /usr/bin.
  
  ```
  > ln -s /usr/lpp/Printsrv/bin/afpxpdf /usr/bin/afp2pdf
  ```

- Modify the PATH environment variable:
  - For JCL, in the aopstart EXEC

  ```
  > n=n+1; env.n=’PATH=/usr/bin:’install_path’/bin:/bin’
  ```

  - For Unix scripts, in the shell running the script.

  ```
  > export PATH=.:/usr/bin:$PATH
  ```

Stop and restart the Transform Manager daemon (aopxfd).
Using Both Transforms At Once

- The new product was designed to coexist with the old product, to ease transition.

- If you do not use symbolic links to point to the new transforms, you can use both transform products at the same time because the names of the transform commands, filters, and daemons differ between versions.

- The Infoprint Server transform configuration file (aopxfd.conf) can contain entries for both Print Transforms from AFP V1.1 and Infoprint Transforms from AFP V2.1.
Issues with error-handling in previous transforms

- Previous transforms error-handling was not ideal. Transforms would either:
  - Ignore the problem and continue
  - Stop processing with error message appended to output document
- Return code of zero even for data stream errors
- No messages issued to the Infoprint Server message log and no ability to suppress trailer error message page on output.
- No convenient way for system programmer to monitor the message log or implement return code checking to prevent printing or distribution of bad output, except for certain specific IOCA decoding errors.
To fix these problems, error-handling enhancements have been added

Now, with error-handling enhancements added in OA35704:

- Transform messages are issued to the Infoprint Server message log, in addition to transform stderr file and (optionally) output data.
- Ability to request whether or not the transform signals a non-zero return code for data stream warnings and errors.
- Ability to tell the transform whether or not to append a trailer message page to output.
- Ability to request more granular MVS-style (0/4/8) return codes, rather than UNIX-style (0/1)
Specify enough memory for large PostScript and PDF jobs

• –m option specifies memory allocated for the transform to run
  – This option is crucial for large PostScript and PDF jobs!
  – Default of 32M is not sufficient for very large jobs, and generally not even optimal for large jobs
  – 256M suggested, 1024M for large jobs, 2047M maximum
  – If enough memory isn’t specified for a job, you will see: AOP2505E Not enough memory is available to transform the data stream. Increase the memory available to this transform in the Infoprint Server transform configuration file. Also, make sure the region size is large enough.
Customizing the Transforms

Specify enough memory for large PostScript and PDF jobs, cont’d

Example of a transform entry specifying increased memory:

```bash
transform ps2afp
    start-command = "ps2afpd -m 1024M"
    min-active = 1
    max-active = 3
    maximum-idle-time = 300  # 5 minutes
    environment = {
        _BPX_JOBNAME -> PS2AFPD
    }
```

Note: stop and restart transform daemon (**xfd**) after any change to aopxfpd.conf
Other settings that may limit memory

- **REGION size**
  - AOPSTART JCL: set in REGION parameter of the EXEC statement
  - `aopstart` Unix System Services command: set in SIZE option on the logon panel for TSO user ID
    - Note: Specify a region size that is at least 10M greater than the value in the -m option.

- **MAXASSIZE value** in the BPXPRMxx member of SYS1.PARMLIB, which sets the system-wide maximum address space size.
  - To set: `SETOMVS MAXASSIZE=268435456`
  - To check: `D OMVS,O`

- **RACF ASSIZEMAX value** for the user ID that starts Infoprint Server.
  - Can be increased on the RACF ALTUSER command.

- **IEFUSI exits** that limit region sizes – make sure these do not apply to OMVS.
  - If you do not want any exits to apply to OMVS, enter this command:
    `SETSMF SUBSYS(OMVS,NOEXITS)`
  - If you need some exits to apply to OMVS, enter this command:
    `SETSMF SUBSYS(OMVS,EXITS(exits))`
    and then do not specify IEFUSI in the EXITS parameter.
What to do if an error occurs

- Look for a CEEDUMP
- Take a trace for IBM support
- Customizing with AOP_FAIL_ON_ERROR for PostScript and PDF files makes life much easier!
- Common messages and what they mean
What to do if an error occurs

Set AOP_FAIL_ON_ERROR to make life easier!

- The AOP_FAIL_ON_ERROR environment variable directs the transform to stop processing when any transform error occurs during the transform
  - No partial output is created.
  - No empty output with error messages.
  - Return code from the transform is >0.
  - The transform stderr file will still contain the same error messages, but AOP2501E will also be sent to stdout to give a more immediate indication of failure.

Set AOP_FAIL_ON_ERROR -> yes in the aopxfd.conf configuration file, for each PS/PDF/PCL2AFP transform entry.
Explicit Page Size Improves Performance

Specifying the page size explicitly with -l and -w for non-default-sized pages can also help with performance

• If you know the actual page dimensions of transform input file, specifying them in the transform parameters can improve performance

• -l \textit{length} and -w \textit{width} can be specified in inches, millimeters or pels
  - recommend using inches or millimeters, as they are independent of the output resolution

\texttt{pdf2afp -a iol-mmr -r 300 -l 11in -w8.5in ...}
Print Services Facility
The Printer Inventory can define PSF FSAs and FSSs
- The Printer Inventory is part of Infoprint Server
- PSF integrated with Infoprint Server inventory in PSF 3.4
- Can use without Infoprint Server license in PSF 4

Also controls AFP Download Plus FSS/FSA

Contains parameters for FSAs and FSSs
- Changing a parameter in the Inventory and stopping ($P$) and starting ($S$) the FSA or FSS causes the settings to take effect
  - no need to take down the entire FSS
- You can avoid stopping the FSS to change the PSF PROC JCL
Use the Printer Inventory

- Can set most parameters set with keywords in the PRINTDEV
  - Also, most flags and single values that required coding Exit 7
  - printer initialization, tracing, and execution options

- You can use a migration program to copy parameters into the Printer Inventory
  - from the PRINTDEV statement, EXEC PARM statement, and the AFPPARMS control statement
  - Most PRINTDEV parms except Library allocations
  - 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=AOP1')
Use the Printer Inventory

In PSF V4R4, you can see PSF messages, including job messages that usually print on the trailer pages, in Infoprint Central

- If PSF is enabled to write messages to the Infoprint Server common message log
  - View FSA and print job messages that PSF has written to the common message log.
  - Search for print jobs and view the properties for each job
  - Release held print jobs, delete jobs, change the priority of jobs, and move jobs (as long as PSF has not started processing the jobs)
Use the Printer Inventory

FSA Name: PRT714
Description: Office Lexmark X792
Location: B4 B8-2 FSS

Operator security profile

Processing Information:
- Blank compression
- Consolidate IM1 images
- Inhibit recovery
- SNMP reporting
- Close libraries when idle
- Capture inline resources
- Release data set when repositioning
- Suppress copy marks

- Issue intervention messages
- Highlight communications failure message
- CSE sheet eject
- CSE preserve page position
- Use Line-Mode Migration LINECT

Check CSE fit: 1. No, 2. First, 3. All
CSE orientation: 1. Portrait, 2. Landscape
Issue setup messages: 1. None, 2. Burst, 3. Forms, 4. All
Offset stacking: 1. None, 2. Data set, 3. Job
Default process mode:
Resolution: 300 (240, 300)

Disconnect action: 1. Stop, 2. Redrive
Disconnect interval: 30 (0-86400)
Management mode: 1. Immediate, 2. Dial in, 3. Output Available

Notify: 
Response timeout: 60 (0-86400)
Printer IP address: op3.bldev.infoprint.com (extend)
Port number: 5001

Printer sharing:
Release mode: 1. Idle, 2. Time, 3. None
Release interval: (0-86400 seconds)
Acquire interval: (0-86400 seconds)
Calculating Print Performance

- How fast can you print (and why not)
- Performance is Simple
  - Either the printer is running at rated speed
    - or - it's not.
  - If the printer is not running at rated speed: either it's starving - or - it's choking.
    - Starving: not getting data fast enough
    - Choking: not processing the data fast enough
PSF Processing

- Reads print data from Spool
- Processes print data
- Accesses resources from libraries
- Sends IPDS data to printer
- 2-way communication with printer
Tuning PSF

- Separate spool disk from resource libraries
- Minimize number of resource libraries to search
- Minimize number of resources sent to printer
- Avoid errors: increases communication
- Checkpointing: minimize frequency
- TCP/IP: use large send buffers of 65K or greater
- z/OS:
  - JES Spool: use TRKCELL (full or half track)
  - channel: use optimum BUFNO value on PRINTDEV
  - minimize number of USERLIBs
## Data rate for Rated Speed

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<th></th>
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<th>2-UP (297 mm length)</th>
</tr>
</thead>
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<td>Duplex</td>
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<tr>
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<td></td>
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<tr>
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<td>506</td>
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<tr>
<td>Duplex</td>
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<td>(8.4)</td>
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<tr>
<td>Simplex</td>
<td>406</td>
<td>812</td>
</tr>
<tr>
<td>Duplex</td>
<td>(6.8)</td>
<td>(13.5)</td>
</tr>
</tbody>
</table>
Application Complexity

- **Mainframe SYSOUT**
  - Worst case: 132 columns x 60 rows = 7920 bytes per page
  - Assume truncated and blank lines = 6000 bytes per page

- **Statement Applications**
  - Pages range from 2000 to 10000+ bytes depending on complexity coding efficiency

- **PostScript Applications**
  - Business letter = 200Kbytes per page
  - Manual page without illustrations = 500Kbytes per page
  - Full page image = 1Mbytes and larger per page

- **50mm x 50mm 600-dpi Monochrome Photograph = 87Kbytes**
Data Rate Example - Statement Application

- Average of 6,000 bytes per page
- 4100-HD3/4 prints A4 pages 2-UP at 1148 pages per minute or 19.1 pages per second
- $6,000 \times 19.1 = 114,600$ bytes per second bandwidth required
AFP Conversion and Indexing Facility converts input to AFP, Indexes the output, and collects print resources

- Traditional AFP resources: FORMDEF, PAGEDEF, Overlay, Page Segment, Fonts
- Newfangled resources--Objects: Image objects (TIFF JPEG), TrueType Fonts, Color Management Resources, PostScript™, PDF (single or multiple pages)…
  - none of these objects are AFP data structures
  - they don’t live in the MVS file system
  ✓ because they’re “unstructured” they live in the z/OS UNIX file system
However, you can put them in the MVS file system!

- They must be “wrapped” in an AFP Object Container
  - AFP data structure that encloses the Non-OCA Data Object
  - identifying information and data encapsulated in AFP structured fields:
Create Wrapped Resources

Fine. That looks like a lot of work…

- ACIF will “wrap” these objects into Object Containers
  - relevant ACIF parameters:
    - RESTYPE=OBJCON (or ALL)
    - Includes color mapping tables specified by the COLORMAP parameter, the COM setup file specified by the COMSETUP parameter, color management resources (CMRs), Encapsulated PostScript (EPS), Portable Document Format (PDF) objects, and TIFF images
    - Note: When printing only one page from a multiple page object container file, all pages in the object container are still saved in the resource file.
    - RESFILE=PDS
      - places each resource in a PDS/PDSE member
    - RESFILE=SEQ
      - creates a sequential dataset in the form of an AFP Resource Object File (Resource Group)
Create Wrapped Resources

//ACIF EXEC=APKACIF,PARM=['PARMDD=ddname[,MSGDD=ddname'],REGION=3M
//INPUT DD DSN=print file
//OUTPUT DD DSN=output file,DISP=(NEW,CATLG),
// DCB=(LRECL=32756,BLKSIZE=32760,RECFM=VBA,DSORG=PS),
// SPACE=(32760,(nn,nn)),UNIT=SYSDA
//RESOBJ DD DSN=resource file,DISP=(NEW,CATLG),
// DCB=(LRECL=32756,BLKSIZE=32760,RECFM=VBA,DSORG=PS),
// SPACE=(32760,(nn,nn)),UNIT=SYSDA
//INDEX DD DSN=index file,DISP=(NEW,CATLG),
// DCB=(LRECL=32756,BLKSIZE=32760,RECFM=VBA,DSORG=PS),
// SPACE=(32760,(nn,nn)),UNIT=SYSDA
//SYSPRINT DD SYSOUT=*
//SYSIN DD /* control statements follow */
CC = YES /* Carriage control used */
CCTYPE = A /* Carriage control type */
CPGID = 500 /* Metadata Code page ID */
/* RESOURCE INFORMATION */
FORMDEF = F1A10110 /* Formdef name */
PAGEDEF = P1A08682 /* Pagedef name */
FDEFLIB = SYS1.FDEFLIB
FONTLIB = SYS1.FONTLIBB,SYS1.FONTLIBB.EXTRA
OVLYLIB = SYS1.OVERLIB
PDEFLIB = SYS1.PDEFLIB
PSEGLIB = SYS1.PSEGLIB
USERLIB = MY.RESLIB /* custom resources */
RESFILE = SEQ /* Resource file type */
RESTYPE = OBJCON /* Resource type selection */
/* FILE INFORMATION */
INDEXDD = INDEX /* Index file ddname */
INPUTDD = INPUT /* Input file ddname */
OUTPUTDD = OUTPUT /* Output file ddname */
RESOBJDD = RESLIB /* Resource file ddname */
RESFILE = PDS /* save as PDS members */