z/OS Report Distribution via Electronic Mail for the z/OS User

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As MVS evolved into OS/390 and now z/OS, there has been more interest in getting reports to users without user intervention and without wasting paper. Lionel Dyck shows you how to make report distribution more convenient and gives you tips to save time and money.

GETTING STARTED

As MVS evolved into OS/390 and now z/OS, report distribution has also evolved from centralized printing to electronic delivery. Before, reports were burst, trimmed, stacked, and delivered, but now reports are distributed in a repository available for online viewing, and printed at remote printers. For the past few years, there has been more interest in getting the reports to the user (1) without wasting paper, and (2) directly without user intervention. This is accomplished by sending the report via electronic mail to the user, who then uses a mail client to see the report.

Advantages for using electronic mail to distribute reports include: more timely report delivery, paper savings, and better control over the delivery so unauthorized individuals do not see the report. In addition, there is enhanced post-processing ability by the recipient of the data.

So what is required to make this happen? Fortunately the answer to this is 'not much,' since the current releases of z/OS come with just about everything that is needed. In addition, just about every company has an existing electronic mail server using the Simple Mail Transport Protocol (SMTP).

The first step is to verify that TCP/IP is installed, configured and active on the z/OS system. This has probably already been done as most companies are already using TN3270 to access their z/OS system and File Transfer

Protocol (FTP) to transfer files to and from their z/OS system.

After verifying that TCP/IP is active, the next step is to configure and activate the SMTP service of TCP/IP. This requires defining to the TCP/IP primary task (typically TCP/IP) the name of the SMTP started task (typically SMTP) in the TCPDATA configuration data set. The SMTP configuration data set then needs to be created and customized for the local environment.

Note that the z/OS SMTP server need only be activated on one LPAR within a JES shared Spool environment (either JES2 or JES3). This is because the z/OS SMTP server reads the mail generated on z/OS from the JES Spool (the mail is created as a SYSOUT file

and routed to the z/OS SMTP server by destination or writer name).

SMTP CONFIGURATION

For the SMTP configuration, there are two basic options.

Option one is to let the z/OS SMTP server route mail from the z/OS system directly to the recipient mail servers whether within the company or somewhere in the Internet. This can present several problems. The z/OS TCP/IP environment may be behind a company firewall and thus not visible to the public Internet. The host name of the z/OS system may not be known outside the local network. Some companies also prevent access through

FIGURE 1: SAMPLE BATCH IEBGENER ELECTRONIC MAIL BATCH JOB

```
//jobname JOB ….                    ← Insert your own JOB Card
//step   EXEC PGM=IEBGENER
//SYSPRINT DD SYSOUT=*
//SYSUT2  DD SYSOUT=(A,SMTP)  ← Change Class & Dest
//SYSUT1   DD *
helo ZOSHOST
mail from: your-e-mail@address    ← change
rcpt to: target@address                      ← change
rcpt to: remote-target@address    ← change
data
From:     your-e-mail@address                          ← change
To:       your-local-e-mail@address           ← change
Cc:       your-remote-e-mail@address          ← change
Subject:  Test message from z/OS using SMTP

This is a test message.

/*
```

their firewalls to the public Internet by their z/OS systems.

Option two is to configure the z/OS SMTP server to forward all electronic mail to your company's current mail server that is already configured with access to and from the public Internet. This option has the advantage that the mail will leave the z/OS system almost immediately and the delivery, queuing, error recovery, etc. will occur on a different platform dedicated to serving mail.

OS/390 and z/OS use different setups for forwarding mail. With both the SMTP configuration file statement **IPMAILERADDRESS** should be configured to point to your existing SMTP mail server (typically the one your desktop mail client connects to). For OS/390, the SMTP server configuration file referenced by the SYSTCPD DD should be a copy of the standard file with the **NSINTERADDR** statements removed or changed to comments. For z/OS, add the statement **RESOLVERUSAGE NO** to the SYSTCPD DD data set. See the IBM publications listed in the References section below for more details.

One step sometimes overlooked is that of configuring the security rules to configure the z/OS SMTP server (started task) as an authorized task with the ability to read, write and purge data from the JES Spool.

Now that the z/OS SMTP server has been activated, the next step is to test it by creating an electronic mail and routing that mail to an internal mail address and an external mail address. (This lets you test delivery both within the company and outside the company). See FIGURE 1 for a sample batch JOB using the IEBGENER program to create the electronic mail. Make the changes to the indicated statements for your environment and test electronic mail addresses, submit it, and then go check your mail inboxes. This sample also demonstrates using the SMTP control statements as documented in the Request For Comment (RFC) 2821 and 2822, which show how to send basic text messages via SMTP.

To include a data set as a file attachment, use Multipurpose Internet Mail Extensions (MIME) control statements. MIME is documented in 12 different Requests for Comments (RFCs) and can be found easily by doing a Google search for "mime rfc". A full discussion of MIME is beyond the scope of this article and is left as an exercise to the reader.

Most companies do not want to invest in the recoding of applications to generate the proper SMTP control statements. Consider using Google for a quick Internet search about information on several vendors who offer an SMTP solution. The same search will find some free solutions. I am the author of one of the free solutions, XMITIP, which is the subject for the rest of this article. Should your company require a vendor-supported solution, much of what you learn here will be transferable, at least in concept. Among the vendor products (that I'm aware of) are JES2Mail from Data21 (http://www.data21.com), VPS/Email from Levi, Ray and Shoup Inc. (http://www.vps.com), SMTP-Send from TBS Software Inc. (http://www.tbssoft.com), and Memocast from Open Software Technologies Inc. (http://www.open-softech.com/mem.htm). These products function differently from XMITIP in that they read the generated electronic mail from the JES Spool, and using information from OUTPUT JCL statements and/or a database of control information, perform the appropriate formatting and distribution. I have not worked with any of these and thus cannot make any qualitative evaluation of them.

THE FREE SOLUTION: XMITIP

XMITIP is short for TSO Transmit Internet Protocol, and is a full SMTP-based electronic mail tool for generating mail on OS/390 or z/OS. With this tool, you can send both message text and one or more sequential data sets to one or more recipients.

It can be downloaded from my Web site (http://www.lbdsoftware.com). XMITIP was designed to be executed under TSO, including Batch TSO, as a TSO command. Also available with the package is a full ISPF interface that simplifies the creation of the XMITIP command and provides a means to test different options interactively.

XMITIP is fully standards-compliant, using only documented system interfaces and standard SMTP conventions. Complete source is provided along with a full Users Guide and Installation Guide. For support there is a Web-based forum and listserv available at http://groups.yahoo.com/group/xmitip.

FIGURE 2: SAMPLE BATCH TSO WITH XMITIP

```
//jobname JOB ….                        ← Insert your own JOB Card
//step  EXEC PGM=IKJEFT1B
//SYSPRINT DD SYSOUT=*
//SYSTSPRT DD SYSOUT=*
//SYSEXEC  DD DISP=SHR,DSN=rexx.exec    ← Change rexx.exec
//MSG      DD *
This is a test message.
//SYSTSIN  DD *
%xmitip your-local-e-mail@address +     ← Change
    Cc your-remote-e-mail@address +     ← Change
    From your-e-mail@address +     ← Change
    Subject 'Test message from z/OS using SMTP' +
    MsgDD msg
/*
```

FIGURE 3: BATCH TSO STEP SENDING REPORT AS RTF

```
//… JOB …
//XMITIP  EXEC PGM=IKJEFT1B,DYNAMNBR=50
//SYSEXEC  DD DISP=SHR,DSN=SYSLBD.LIONEL.EXEC ← Make this generic
//SYSPRINT DD  SYSOUT=*
//SYSTSPRT DD  SYSOUT=*
//REPORT   DD  DSN=hlq.report.file,DISP=SHR
//ADDRS    DD *
CC User1@host.com
CC user2@host.com
CC user3@host.com
//MSG      DD *
This report contains the weekly data for the xyz reporting
System. Please review and take appropriate action.
//SYSTSIN DD    *
%xmitip address1@host.com +
        MsgDD MSG +
        bcc owner@host.com +
        From "Report Owner" <owner@host.co> +
        AddressfileDD ADDRS+
        Subject 'Report from Job &job with High Code &rc' +
        FileDD report +
        Filename report.rtf +
        Format RTF/Landscape/7/
```

A short list of XMITIP features is:

- Send simple, text only, messages.
- Send messages with file attachment(s).
- Include JOB Name, JOB Number, Completion codes, etc. in Subject and in Message Text
- Use To, CC, and BCC along with Reply To and Return Receipt options.
- Support for standard SMTP security options (importance, priority and sensitivity).
- Distribution lists can be created and used to send to large numbers of recipients.
- Optional electronic mail address validation via an LDAP lookup.
- Attach z/OS data sets (reports) as plain text or convert the data to HTML, Adobe Portable Document Format (PDF), or Rich Text Format (RTF).
- Attach the z/OS data set as a Binary file attachment.
- Compress the file attachment using one of the many ZIP utilities available (including ASE's ISPZIP, ASI's PKZIP/MVS, Data21's ZIP/390, and the free InfoZip).
- Optional support for the OS/390 and z/OS SMTP Secure facility is provided.

The conversion to PDF is accomplished using the TXT2PDF utility provided to the z/OS community freely by Leland Lucius, which is available for download from the same Web site as XMITIP. TXT2PDF can be used outside of XMITIP and comes with a full ISPF dialog to interactively create the TXT2PDF command and ease the testing of different options to get the resulting PDF file just right. Leland also provided the routines that convert the file attachments into MIME format to preclude unwanted character translation during the delivery of the electronic mail.

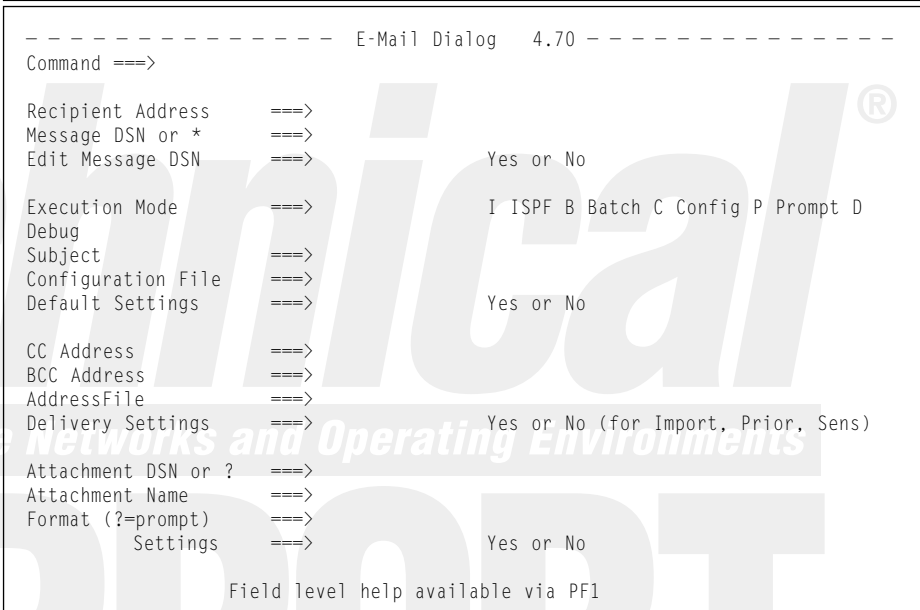There are advantages to each of the file attachment formats:

Plain Text is useful if the information will be imported and used in an application on the recipient's workstation. Be aware that z/OS reports are typically printed on printers using a fixed pitch font, and most mail clients use a proportional font for display and printing which will skew column aligned information.

HyperText Markup Language, or HTML, is used to create Web pages and with XMITIP, you can define the font size for the default fixed pitch font, as well as the color of the text and of the background. This format is useful if the recipient does not have a word processor to view RTF files or a copy of Adobe Acrobat to read PDF files.

FIGURE 4: BATCH STEP TO SEND NOTIFICATION E-MAIL ON ABNORMAL TERMINATION

```
//    JOB …
… job steps ….
//TEST IF (RC > 0 | ABEND = TRUE) THEN
//*  The PARM statement is continued with a non-blank (X) in column 72
//*  and the continuation starting in column 16.
//TSOB EXEC PGM=IKJEFT1B,
// PARM='%XMITIP first.last@company.com SUBJECT "JOB &JOB FAILURE"   X
//           MSGT "REASON: &RCA"'
//SYSEXEC  DD  DISP=SHR,DSN=system.rexx.library
//SYSPRINT DD  SYSOUT=*
//SYSTSPRT DD  SYSOUT=*
//SYSTSIN  DD  DUMMY
// ENDIF
```

FIGURE 5: XMITIP ISPF INTERFACE

```
– – – – – – – – – – – – – –  E-Mail Dialog   4.70 – – – – – – – – – – – – –
Command ===>

Recipient Address      ===>
Message DSN or *        ===>
Edit Message DSN        ===>                      Yes or No

Execution Mode          ===>                      I ISPF B Batch C Config P Prompt D
Debug
Subject                 ===>
Configuration File      ===>
Default Settings        ===>                      Yes or No

CC Address              ===>
BCC Address             ===>
AddressFile             ===>
Delivery Settings       ===>                      Yes or No (for Import, Prior, Sens)

Attachment DSN or ?     ===>
Attachment Name         ===>
Format (?=prompt)       ===>
          Settings      ===>                      Yes or No

            Field level help available via PF1
```

Rich Text Format, or RTF, is a standard document interchange format and is supported by nearly every word-processing program. With this format, you can configure your data so that it is displayed and printed using any valid font size for the Courier fixed pitch font. The paper orientation (landscape or portrait) and size can be defined. Thus the report, when viewed or printed by the recipient, can look very close to the way it was designed when printed on the classic mainframe printer.

Portable Document Format, or PDF, is the most robust option by providing everything that RTF formatting does along with color options (text and background), paper watermarks, and colored lines (green bar) that simulate old mainframe print paper. This option also allows the generated PDF to be secured using either 40-bit or 128-bit security with all of the allowed PDF security options (read only, no copy, no print, etc.). Thus to send a report that the recipient can not edit or change, you would use this formatting option.

Note for testing purposes that it is helpful to have an external (non-company) electronic mail address. An easy way to get one is to use one of the many public, Web-based, and electronic mail services such as myway.com, yahoo.com, hotmail.com, or netscape.com.

When XMITIP is installed, there is a simple configuration process to define the local environment to XMITIP and make it ready for use. See FIGURE 2 and compare it to FIGURE 1.

It is unlikely that you will just want to send a few lines of text via electronic mail, so here are a few more examples.

FIGURE 3 demonstrates a batch step that will e-mail a report generated by a prior step to several addresses, including a short message. The report will be formatted as a RTF file in landscape orientation so that it can be viewed using Microsoft Word, or any other word processor that supports RTF format.

FIGURE 5 illustrates the primary ISPF panel for the XMITIP ISPF interface. This interface can be used to try various options for creating

electronic mail and report formats, including the creation of the batch JCL that can be easily tailored for inclusion in a production JOB. This interface provides prompting for many of the options along with field-level help to assist with filling in the information on the panels.

XMITIP is being used by over 175 different companies (based on a list of those who have requested to be notified of updates) for many different purposes. One recently discussed use is to generate an electronic mail when a JOB ends abnormally. The XMITIP step is wrapped in JCL IF/THEN/ENDIF statements and only executed if a prior step abends or has a high condition code. See FIGURE 4 for sample JCL that can be added as the last step of a JOB to generate an electronic mail notification when the JOB ends abnormally. See your IBM JCL User's Guide for more information on using the IF/THEN/ENDIF constructs.

The most frequently mentioned use of XMITIP is to distribute reports generated by a JOB to the report's users via electronic mail.

References

The following two publications are excellent resources for configuring SMTP.

- OS/390 IBM Communications Server
  IP Configuration Guide
  Version 2 Release 10
  Document Number SC31-8725-01
  Section 2.10.1

- z/OS Communications Server
  IP Configuration Guide
  Version 1 Release 2
  Document Number SC31-8775-01
  Section 2.11.1

For JCL, refer to:

- z/OS MVS JCL User's Guide
  Document Number SA22-7598-01
  Program Number
  5694-A01

For RFCs check out http://www.faqs.org/rfcs where you can read all of the RFC documents.

If there is a desire or need to create the report with the SMTP control statements directly from within an application program, then XMITIP can help there as well. Just use XMITIP to create the electronic mail with the formatting that you desire and then rerun XMITIP with the DEBUG option. This will produce a report showing all of the SMTP and MIME statements along with the converted data without actually sending the electronic mail. Avoid doing this for format options other than plain text, HTML and RTF, as the other formats require additional processing that is not easily mimicked.

Included with the XMITIP package is information on how to configure SMTP for national language support, thanks to Felipe Cvitanich.

CONCLUSION

Distributing reports via electronic mail is easy, convenient, and can save time and money. If your company requires a vendor-supported product, there are many available that you can choose. If your company is amenable to an open source freeware solution then try XMITIP, which you can download freely from http://www.lbdsoftware.com. You will also find the TXT2PDF package that is required if you wish to do PDF file attachments as well many other open source freeware solutions for OS/390 and z/OS. ⑯

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