

From IBM/MVS to PC SAS for Windows, a SAS/AF Frame Entry Application

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Abstract

This paper describes details involved in the transition of a mainframe, batch mode SAS system to a SAS/AF Frame Entry application using Windows® point-click techniques.

The Proficiency Analytical Testing (PAT) Program is a joint effort of the National Institute for Occupational Safety and Health (NIOSH) and the American Industrial Hygiene Association (AIHA) to improve the performance of industrial hygiene laboratories. Over 1400 industrial hygiene laboratories throughout the United States and Canada participate. Participants analyze a series of metals, silica, asbestos, and organic solvent samples and receive performance ratings quarterly. These ratings are used by a professional society, AIHA, to accredit industrial hygiene laboratories.

The PAT System is a SAS application which manages computer aspects of the PAT program, including database management, data analysis, and report production. The system originally ran under IBM mainframe SAS 607. Due to rising mainframe costs, the advent of high powered PCs and the ease of managing desktop applications, the PAT system was converted to a more user-friendly, less expensive, PC based system.

This paper discusses the processes of the transition, including movement of SAS files using SAS/CONNECT, movement of program files, incorporation of the original SAS programs with AF Frame Entries, development of a user-friendly AF

application, and issues (file backup, advantages) under the PC environment.

SAS software used includes: SAS/BASE, SAS/GRAPH, SAS/STAT, SAS/FSP, SAS/AF Frame and SAS/CONNECT.

Introduction

The original PAT system on an IBM mainframe includes a menu-driven user interface. The interface consists of a series of CLIST commands, SAS/AF and FSP catalog entries, SAS data libraries, SAS program files and JCL which run behind the menu-driven interface to fulfill users requests. Quarterly, up to 32 samples for each laboratory and 4 rounds data are involved in laboratory performance rating and report generation. Prompt and accurate results are a primary concern of the system.

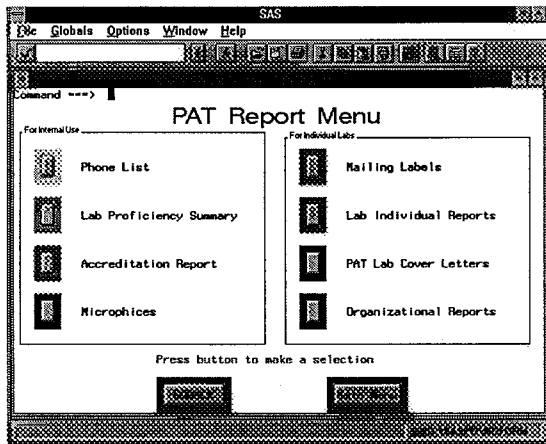
The goal was to accomplish the transition of the PAT system from mainframe to PC between production cycles and avoid any possible programming errors due to the transition. A major part of the PAT system is a series of SAS programs for data manipulation, statistical analysis, and report production. It is important to minimize changes to these SAS programs so they are saved separately from SCL code and are only included to SCL submit block for execution by using PREVIEW function. Hence, if errors occur, it can easily be determined whether they are from SCL or from a SAS program (syntax or data errors). This strategy saves development time and makes it easier to modify these background SAS programs or enhance SCL for front

end display.

The plan was to 1) develop a user-friendly AF/Frame interface to replace the original user interface run by CLIST and SAS catalog entries, 2). download all the files to the PC, 3). link SAS programs with the new user interface, and 4). test and implement the system for production.

Developing a user-friendly AF/Frame interface

The user-interface was designed using SAS AF/Frame, because Frame entry has the advantages of Graphical User Interface and can handle all the tasks necessary for the PAT program. Approximately 80 Frame entries were created and linked to replace



the mainframe user interface. The following is an example of the display. Push Buttons, Graphic Test, and Text Labels are used in this screen:

The intent of this paper is not to discuss the details for the development. However, the following observations were made:

- Use of consistent design standards (color, font, style, size, and appearance) provides for easier development and a more uniform user interface.

- Inclusion of key instructions on the screen provides users a quick reference of options. Options of “CANCEL” or “EXIT” are also necessary.

Downloading files from MVS to PC SAS for Windows

Depending on the file type, PAT files were downloaded through different utilities:

- REPORT entry can not be downloaded directly. The SAS REPORT procedure must be invoked with the dataset and related REPORT entry. At the REPORT Window, use LIST under the LOCAL options from the pull down menu to produce a listing of the REPORT language that defines the current report. Then download this listing and use it (report language) to recreate the report definition in the PC environment.
- For SAS catalog and SAS data library, SAS/CONNECT was used.
- For SAS program files and rawdata files (EBCDIC), the SENDFILE/GETFILE utility is used. Some preparation or editing was necessary before or after the files were downloaded.

- Preparation on the Mainframe

In TSO/ISPF, program files usually contain a series of 8 digits sequence numbers at column numbers 72 to 80, (if the file profile has the NUM option). This number does not affect the ability of SAS to run on the mainframe, but will cause SAS syntax errors in the PC environment. These numbers are also hard to eliminate in the PC environment.

(One solution is to use WordPerfect® 5.1, the BLOCK with RECTANGLE option, to remove whole block of the text.)

However, it is relatively easy to remove these numbers under TSO/ISPF in the following manner:

1. To remove all the sequence numbers at columns 72-80, type the command:

```
C  p'=' ' ' 72 80 all
```

(Changes from picture string to blank at column ranges 72 - 80 for all lines)

2. Next at command line type:

```
PROFILE
```

The current file profile appears on the screen. Type the NUM OFF command to change the profile from NUMBER ON STD to NUMBER OFF.

The JCL DD statements were converted to SAS FILENAME or LIBNAME statements. Since most of the PAT programs on mainframe were already in this format, the majority of changes was to remove JCL and add system options and title statements.

Replacing JCL DD statements with SAS FILENAME or LIBNAME statements make SAS programs more portable.

- Editing Files on the PC

When a SAS program file was downloaded from IBM/MVS, TSO/ISPF to the PC environment, certain characters used in the SAS program were automatically converted to characters no longer recognized by SAS. The

following characters are typical in the PAT system:

The concatenate symbol under TSO/ISPF looks like “||”, when the file is transferred to PC SAS, the symbol is automatically converted to “]]” which is not recognized by PC SAS. The solution is to use the global change command at the SAS program editor to change it to the symbol “||” (on the 108 key keyboard, it is the top character on the key for “\”). The command is :

```
C  ']]' '||' all
```

The symbols for SAS/IML matrix on mainframe are “(|” and “|)” but on PC should be “[|” and “|]”. Use the global change command at SAS program editor to convert this symbol to “[|” and “|]”. The commands are:

```
C  '(|' '[|' all
C  '|)' '|]' all
```

If the file width is longer than 72 in columns, contents on columns > 72 will be truncated when the file is moved to PC. Be aware of this problem when a SAS syntax error occurs.

Organizing PC files

In the PC environment, unlike the mainframe, filenames are limited to 8 characters plus 3 characters for an extension. It is important to organize files on the PC so it is easier to locate and manage them. In the PAT system, separate hierarchical subdirectories were created to store the following system programs and data files:

Main directory - D:\PAT

SAS Macro library
 - D:\PAT\SYSTEM\MACLIB*.SAS
 SAS programs
 - D:\PAT\SYSTEM\PGMLIB*.SAS
 SAS catalog
 - D:\PAT\SYSTEM\SASCAT*.SC2
 SAS format library
 - D:\PAT\SYSTEM\SASFMT*.SC2
 SAS data sets
 - D:\PAT\SASDATA*.SD2
 ASCII data files
 - D:\PAT\RAWDATA*.DAT
 External files to store SAS output
 - D:\OUTPUT*.*

Implementing and testing the system

In this step, SAS programs were downloaded from the mainframe and made to work behind the new AF/Frame user interface.

As mentioned earlier, the SAS programs are saved separately from SCL code. The PREVIEW function was used whenever a SUBMIT BLOCK was needed to include a SAS program for execution. This made the testing and debugging tasks much easier. As the system production can not be delayed, this also provides a back-up in case there are some problems on the AF or SCL. Production can still be accomplished by submitting SAS programs through the Display Manager.

Since the printing capacity on PC is not as generous as on the mainframe, all PAT output was routed to external files for printing and future retrieval. The PRINTTO procedure was used to route PAT output to external files.

Various forms are needed for PAT system output. (Example: double-sided printing and printing using alternate paper supply trays)

SAS forms were created to control these output formats. These forms can be called by using an option statement in a SAS program or in the AUTOEXEC.SAS file. Example:

```
Options forms=sasuser.profile.  
output.form sysprint='lpt1:';
```

The transition of PAT from the mainframe to the PC was completed in a very short time frame for the following round production.

Summary

- The PC PAT system saves \$ 10,000 mainframe computer cost annually.
- Under the Windows environment, it is easy to move files around in PC software such as WordPerfect®, Harvard Graphics®, Freelance®, and even e-mail.
- PC graphical based interface is more user-friendly.
- Because there is no default backup on the PC environment, the following options are used for file backup:
 - tape backup and high capacity ZIP® disk.
 - send short term backup files to the network server
 - send long term backup files to the mainframe using SAS/CONNECT
- Some jobs take longer time to run on the PC. For example, one of the PAT report programs takes 12 hours to complete. This program uses SAS macros to sort 1400 laboratory reports generated from different SAS procedures and write the results to an external file.

Reference

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Acknowledgments

The authors would like to thank Curtis A. Esche of the National Institute for Occupational Safety and Health for his valuable assistance in the preparation of this manuscript.

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