This paper describes a utility to convert between FOCUS and SAS data bases using a SAS/AF interface and CMS EXEC2 programs.

We first explain the rationale behind our facility and how we expect our clients at Pacific to use it most. Next, we describe some of the more interesting features of the interface, including a companion SAS/AF system that distributes updates of the utility and keeps track of its usage by clients. Lastly, we describe some of the enhancements we expect to introduce in the near future.

Rationale for the Interface

We work in a division of Pacific Bell concerned with managing information and systems for the Marketing Department. Specifically, our district functions as an "information center." Our responsibilities include guiding clients to appropriate data bases; building small-scale software applications, and; lending subject matter expertise, for example, statistical interpretations to reports and analyses.

In this context, we perceived a need for a facility to link the efficiencies of data storage and retrieval gained from our company's chosen Data Base Management System (DBMS), FOCUS, with the analytical and reporting power provided to end-users by SAS software. Table 1 summarizes this rationale (Tables and figures are found at the end of the paper.).

Under this scenario, we believed our most frequent conversions would be from FOCUS to SAS as illustrated in Figure 1. Figure 1 indicates the type of FOCUS extract acceptable as input to our utility: These must be single-segment or "Flat" files and should be created through an "ON TABLE HOLD" statement in FOCUS. In other words, our utility can not convert hierarchal FOCUS data bases and both a FOCUS MASTER and a FOCUS FOCTEMP file must be present for FOCUS-to-SAS transfers. Figure 1 also highlights our belief that in the future, many of the converted SAS data bases will be downloaded ultimately to PCs for additional distributed processing.

Main Features of the Interface

In this section, we first explain how our application is distributed and managed. The EXEC2 program and SAS/AF screens driving the interface are described next. We then outline how user inputs are validated.

Computing Environment and Software Management

Our application was designed for multiple IBM mainframes connected through, and operating under, VM/SP CMS. The problems of distributing and updating our application as well as accounting for its usage by clients were solved through a companion SAS/AF system called OVERLORD. A representation of the main menu for the OVERLORD system is shown in Table 2.

Option 1 distributes the programs that users must have on their accounts to invoke an application. For our conversion utility, this consists of a single CMS EXEC2 program called FOCUSAS. The application manager has the choice of distributing software to either individual user accounts or all existing accounts on a particular machine, for example, to provide updates of programs.

Option 2 distributes the additional programs required to run an application to master accounts on each machine. The software in these master accounts is accessed by users on a particular machine when they execute an application. FOCUSAS, for example, requires one additional EXEC2 program to check users' virtual storage, a SAS program to invoke PROC DISPLAY, the appropriate SAS/AF catalog, a library of SAS macro programs, and a SAS/AF function key profile.

Option 3 allows the application manager to define an OVERLORD account and the master sub-accounts specific to each machine. Option 4 permits the manager to specify which programs constitute an application for distribution.

Option 5 generates printed reports on: which and when users were sent software; the number of times and dates the software was used, and; comments on an application submitted by users. Lastly, Option 6 allows the application manager to pare down records in these tracking and comment data bases from a given cutoff date.

With this background in mind, we will now turn to the FOCUSAS interface itself.

The FOCUSAS EXEC2 Program

Clients invoke the FOCUSAS interface by executing a CMS EXEC2 program. Table 3 summarizes the operations carried out by this EXEC.

Only a few additional comments are needed here to understand the functions listed in Table 3. The check for updates is made by examining a user's CMS reader for the file FOCUSAS EXEC sent from the OVERLORD account. If this file is found, then execution is blocked until the
new version of the EXEC is read in or purged from the reader. Users are warned to save files on temporary disks before reconfiguring their virtual storage if necessary. The accessed temporary disk space holding the programs copied from the master account at execution time is released and detached at the end of the FOCUSSAS session. Thus, the typical user never has to bother with maintaining the software on their account (and the potential hazards this could entail are avoided as well!).

Lastly, accounting records are created and sent to the OVERLORD account each time the EXEC is invoked using the IDENTIFY and SENDFILE CMS commands.

The FOCUSSAS SAS/AF Interface

Table 4 is a representation of the main menu for our FOCUSSAS utility. We will discuss these options in reverse order, from high to low.

Option 6 displays a 10 line screen to users for submitting comments, suggestions, or criticisms about the software. These are sent to the OVERLORD account for review by the applications administrator.

Option 5 puts users into the CMS FILELIST environment to take stock of existing SAS data bases with a CMS FILETYPE of SASDATA. SASDATA is a widely used first-level or libref for SAS data bases at our installation. It is also the default libref for SAS data sets output from Option 1.

Options 3 and 4 function similarly as Option 5 to search for FOCUS MASTER files and data bases. Note that users can learn what is contained in a FOCUS data base by issuing CMS XEDIT or TYPE commands from the FILELIST environment under Option 3.

Options 2 and 1 respectively use the PROCs TOPOC and FROMFOC contributed to the SUGI Supplementary Library by Anna DeFilippi of the Barnett Computing Company. These user-written PROCs are documented in the SUGI Supplemental Library User's Guide, Version 5 Edition on pages 607-617.

Option 2 leads to a SAS/AF program screen where users are instructed to enter CMS filename-type-filemode combinations identifying both an input SAS data set and an output FOCUS data base. Additional options on this program screen permit users to print the resulting FOCUS MASTER file either locally on their PC-attached printers or at one of the high-speed printers on our PACTIME network. Users can also have this output directed straight back to their terminals. All variables from the input SAS data set are converted, with FOCUS aliases becoming SAS variable names and default variable labels generated from FOCUS fieldnames if the latter exist on the input MASTER.

Validation of User Input

Under either Option 1 or 2, responses from users are validated. Required fields not filled out are flagged, for example, the lack of a CMS filename for FOCUS input under Option 1. The validity of CMS filenames, filetypes, and filemodes are also checked. CMS STATE commands are used to verify that Input files exist, that output files do not, and to confirm access on needed CMS minidisks. Users are given the choice to replace existing output files if they so desire.

Further Enhancements

Our FOCUSSAS interface could use some additional work. Two enhancements are planned for implementation in the near future.

On FOCUS-to-SAS conversions, we would like to permit users to fill out ATTRIB statements for the resulting SAS variables and to specify which variables they wish to keep in the data set.

The second enhancement would include a user-friendly front-end to help clients extract single-segment HOLD files from corporate FOCUS data bases before performing the conversion to SAS. This facility would have to be executed under FOCUS before the SAS/AF interface was invoked, perhaps as a prior step in the FOCUSSAS EXEC2 program. This enhancement would be significant as it would permit end-to-end conversion from our large company data bases to user-specified extracts available for processing by SAS on either our mainframes or personal computers.

Acknowledgements

I want to mention that my colleague, Mr. Peters, programmed the software behind both the FOCUSSAS and OVERLORD applications. Furthermore, he designed OVERLORD. My role was only to identify the need and provide a crude design for the FOCUSSAS application. As Mr. Peters was under contract to Pacific Bell when he wrote these programs, requests and technical questions must be directed to me at the following address: Charles F. Sprague

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I will be happy to answer any questions I can, but readers are duly warned that the difficult technical ones will be passed along to Mr. Peters.
Table 1  Rationale for FOCUSSAS Utility

- Huge corporate data bases managed efficiently using FOCUS DBMS (company standard)
- Support programmers and clients familiar with extracting subsets of data using DBMS
- Complexity and pace of managing markets requires flexible and powerful tools in the hands of decision-makers
- Such clients served best through combining advantages of efficient access with statistical and reporting capabilities
- FOCUSSAS utility leverages both assets: Data extraction efficiencies from DBMS and end-user capabilities provided by SAS software (especially SAS on a PC)

Table 2  Options from Main Menu of OVERLORD

1. Distribution of files to User Account(s)
2. Distribution of files to Master Accounts(s)
3. Overlord and Master Account Specifications
4. Overlord Application Files Control
5. Process USER, USAGE, or COMMENT reports
6. Reduce numbers of records in USER, USAGE, or COMMENT files
Table 3  Functions of the FOCUSSAS EXEC

- Link/Access to machine MASTER account
- Check for latest version of FOCUSSAS utility
- Check that account has enough virtual storage to execute SAS* software
- Link/Access temporary disk space to hold SAS* software for utility
- Copy SAS* software from machine MASTER account
- Create usage record and send to OVERLORD account
- Execute SAS* and PROC DISPLAY to invoke FOCUSSAS main menu

Table 4  Options from Main Menu of FOCUSSAS

1. Convert a FOCUS* data base to a SAS* data set
2. Convert a SAS* data set to a FOCUS HOLD file
3. Issue the CMS command: FILELIST * MASTER *
4. Issue the CMS command: FILELIST * FOC* *
5. Issue the CMS command: FILELIST * SASDATA *
6. User Comments, Suggestions, Criticisms
Figure 1: Global Flow of FOCUS to SAS Conversions

Master Company FOCUS Data Bases
↓
User FOCUS Hold (FOCUSLISP) Files
↓
FOCUS LISP Conversion Utility
↓
SAS Extract Data Bases
↓
SAS System on Personal Computers

SAS System on PCs Data Bases
↓
Reports and Analysis

Spread sheets
Figure 2 Global Flow of Software Management through OVERLOAD Facility

OVERLOAD Account: Original Copies of Software and Usage/Comment Data Bases

Distribution of Software to Master and User Accounts

MASTER Account (for Machine #1): Working Copies of Software

User Account A on Machine #1

Usage Records and Comments

MASTER Account (for Machine #2): Working Copies of Software

User Account A on Machine #2

Usage Records and Comments

User Account B on Machine #1

Usage Records and Comments

User Account B on Machine #2

Usage Records and Comments

References

*SAS and SAS/AF are registered trademarks of SAS Institute Inc., Cary, N.C.

+FOCUS is a product of Information Builders, Inc., New York, N.Y.