FRONT-END WYLBUR MACROS WITH SAS: EXPERIENCES IN FACULTY WORKSHOPS

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ABSTRACT

A series of Superwylbur macros has been written which allows SAS users to submit jobs without JCL and to retrieve SAS output and automatically report SAS and JCL errors.

We have taught SAS workshops to our faculty both before and after these macros were implemented. Their effect on novice users has been positive and dramatic, far more than we originally anticipated.

BACKGROUND

Over the past five years, we have offered SAS workshops for the faculty and graduate students at Rutgers Medical School. We usually schedule three half-day sessions, typically one week apart, to introduce the fundamentals of SAS and our data entry/editing system, Superwylbur (a super set of Wylbur marketed by Optimum Systems Inc.). Our new SAS users were often uncomfortable with writing the necessary 3 or 4 lines of JCL. Even though the users were told to copy the JCL lines carefully, they tended to make errors. In addition, the fetching of jobs by DD name in Wylbur is difficult to explain to a novice user. Before we created our SAS macros, we would teach SAS by demonstrating a simple program. Then we would say, "We have to precede this program with a few lines called JCL, which give the computer information about your account number, etc." Half an hour later, we would be telling people about remote numbers and bin parameters, and be looking at a classroom of blank faces. Beginners are frightened by JCL. They do not see the difference between "//SAS.SYSIN DD **" and "//SAS.SYSIN DD **." What we gain in using the macros is one-half to one hour of classroom time spent in discussing JCL and Wylbur RUN and FETCH commands. More importantly, we avoid intimidating the novice user with complicated instructions and procedures.

With this in mind, we wrote several Wylbur macros which would automatically retrieve SAS output. To use these macros, a user needs only to write his SAS program without any JCL. A Wylbur command "SAS" evokes the macro which generates the appropriate JCL and adds an "OPTIONS NOOVP NOCENTER:" line to the SAS program. Another macro "GOGET" automatically retrieves (fetches) the SAS output. All errors in the SASLOG are printed and the SAS output is retrieved into a Wylbur workspace where it can be listed.

We were surprised at how such a modest change in our instructional methods affected our students. Using our macros made SAS look almost "interactive." We do have CMS/SAS available but choose not to use it for a variety of reasons.) Our students could now concentrate on writing their programs and avoid JCL errors. We gain a further advantage: When our users become more sophisticated and their programs exceed the default CPU and I/O parameters, the GOGET macro translates the system error messages into English (e.g. S322 becomes "Add more CPU time.")

Now that we have had several years of experience teaching new SAS users and using our macros, we have completely rewritten the macros to further enhance their usability. This revision was also prompted by a major operating system change (from MVT/HASP to MV5/JES3). We substituted the new macros when the system was changed and our users did not have to make any changes in their programs. In fact, some of our users did not even realize the system had changed.

A BRIEF DESCRIPTION

1. SAS: This macro generates the JCL to run a SAS program, adds an "OPTIONS" card, and submits the program. The macro is flexible and prompts the user for several JCL options. It can run the Wylbur default workspace, a temporary workspace, or a permanent data set.
The user can supply a job name or have the system generate one. Choices can be made concerning where the output should be sent, discount vs. normal rates, and the user's name. Other parameters are set automatically by examining the account number and the internal Wylbur bin parameter. The macro is programmed with default values for CPU, I/O, and region, any of which can be modified by the user. A novice user can reply to ALL the prompts by hitting the carriage return and still have his program run using the default values for all options. Figure 1 shows a typical interaction with the SAS and GOGET macros.

2. GOGET: Once the job has been processed (an average of 5 minutes on our system), the GOGET macro will fetch the SAS log, the SAS output, and the JCL. The JCL is scanned for abend codes indicating inadequate CPU, I/O, region, and lines. If JCL errors are found, easy to understand messages are printed at the terminal. Next, all lines in the SAS log flagged as errors by SAS are printed, along with an explanation of the error codes. Finally, the SAS output, if there is any, is listed at the terminal. When the macro is finished or interrupted by the user, a choice of printing the job at a remote printer or purging the job is offered to the user.

3. RERUN: The RERUN macro allows a user to correct a SAS error and rerun the program with the same parameters as the previous job. This saves having to reply to the SAS macro prompts a second time.

4. SASEDIT: This macro is identical to the SAS macro except that an additional options line, "OPTIONS OBS=6;" is added. This encourages our users to do an edit run before analyzing their data.

First, the macro reads internal Wylbur parameters such as BIN and account number and uses these values in its decision process. For example, users sending printouts to the laser printer at Rutgers University's Hill Center, have a bin such as H2ZD (H/2 digits/Letter (A-T)). The macro can determine if a Hill Center bin has been designated and automatically set the proper remote and destination JES3 parameters. If, for some reason, the bin was never set, the macro will ask for a bin. Inspection of the account number will determine which remote is to be used.

A second method making these macros "user friendly", is supplying default values for all questions and making a carriage return the universal default response. Thus, the user can press the return key to every prompt and still have his program run successfully.

The third technique is asking questions in a hierarchical fashion. For example, a single question asks if special resources are required. A "yes" reply will then trigger questions about CPU, I/O, and region values.

Finally, to keep the macro simple, we allow the user some flexibility in answering the prompts. We delete blanks and periods from replies and truncate certain parameters, such as job name, to the maximum length allowed by MVS/JES3.

GENERATED JCL

The actual lines that were generated as a result of running the example in figure 1, is shown below (for those whose legs do not turn to jelly at the sight of a "II"):

```plaintext
//MYJOB JOB (LAB0004,CL25,999) ,'CODY', //TIME=(,19),MSGLEVEL=(0,0) //*FORMAT FR,DDNAME='DEST=NJECNV5.RMT23 */MAIN CLASS=+0,LINES=15 //EXEC SAS,REGION=256K //SAS.SYSIN DO * OPTIONS NOOVP NOCENTER;
```

Copies of these macros are available from the authors upon request. Please write to either author at the addresses below:

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FIGURE 1 - A SAMPLE WYLBUR SESSION

COLLECT
1. ? DATA;
2. ? INPUT X @@;
3. ? CARDS;
4. ? 4 5 6 7 8
5. ? PROC MEANS N MEAN MAXDEC=3;
6. ? PROC UNIVARATE;
7. ? VAR X;
8. ? ***

(Line 6 contains a deliberate error.)

SAS
ENTER DSN OR <RETURN> TO RUN WORKSPACE > (return was pressed)
ENTER JOB NAME OR <RETURN> FOR COMPUTER GENERATED NAME > my job
ENTER CLASS (-1 OR -2) OR <RETURN> FOR +0 > (c/r)
DO YOU WANT OUTPUT ON YOUR TERMINAL (Y/N) > Y
ENTER LAST NAME OR <RETURN> FOR "THROW.AWAY" > CODY
SPECIAL RESOURCES: CPU,I/O,OR REGION (Y/N) > N
7356 IS YOUR JOB NUMBER 04/05/82 Monday 1:46:03 p.m.
GOGET
NO JOBS IN FETCH QUEUE

... A few minutes later.

GOGET
IAT8131 J=MYJOB (7356), ID=LA00004, L=107
JOB NUMBER <RETURN> FOR LAST JOB > (c/r)

7
PROC UNIVARATE;

ERROR: 183
8 VAR X;

ERROR: 180
180: STATEMENT IS NOT VALID OR IT IS USED OUT OF PROPER ORDER.
183: THE PROCEDURE NAME IS NOT KNOWN TO THE SYSTEM.
NOTE: SAS STOPPED PROCESSING THIS STEP BECAUSE OF ERRORS.

NOTE: SAS USED 169K MEMORY.
ERROR: ERRORS ON PAGES 1.

LIST T A UNN FOR COMPLETE SASLOG
PRESS BREAK TO STOP, RETURN FOR LISTING : (c/r)

STATISTICAL ANALYSIS SYSTEM

<table>
<thead>
<tr>
<th>VARIABLE</th>
<th>N</th>
<th>MEAN</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>5</td>
<td>6.000</td>
</tr>
</tbody>
</table>

**TYPE '1' TO PRINT, '2' TO PURGE, RETURN TO LEAVE JOB IN FETCH QUEUE:**