Combining SAS Software and SYSTEM 2000 Data Management Software
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ABSTRACT

SYSTEM 2000 Data Management Software excels in the production data processing world of entry, retrieval, integrated applications development, and data management. The SAS System product lines is exemplified through day-to-day management of data extraction, analysis, and presentation. The complementary nature of these two SAS Institute data products is illustrated through the management of a software process.

SYSTEM 2000 Data Management Software excels in the production data processing world of entry, retrieval, integrated applications development, and data management. The SAS System product lines is exemplified through day-to-day management of data extraction, analysis, and presentation. The complementary nature of these two SAS Institute data products is illustrated through the management of a software process.

Gerry Garcia started Garcia Truck Leasing Company in 1977. He specializes in medium-sized trucks (10 to 22 feet in length) that pull trailers. The home office is in New York. The business has grown into a nationwide enterprise with offices in five regions. The company grosses about $9.6 million annually and is working hard to enhance its return on a considerable investment in trucks and service centers.

Keeping an eye on investment return is the job of Garcia Truck Leasing (GTL) controller George Harrison. His obsession with cash flow is frequently communicated to Bonnie Rait, the GTL sales manager. Account collection activities are split between sales reps working for Bonnie and credit department reps working for George. Gerry has given these two managers the job of pinpointing cash flow bottlenecks and recommending solutions. Ian Anderson, the GTL data manager, is also involved in the discussions.

However, Ian has his own worries. Until recently, GTL was small enough that all corporate data processing needs could be met with rectangular files and base SAS software. With new terminals and more sophisticated users being added monthly, Ian sought the performance and data security features normally found in base management systems. He heard that SAS Institute offered a reasonably priced data base in SYSTEM 2000, so he brought it in and easily justified its use in several application areas.

Ian researched his data structure requirements for the Customer Data Base (CBD) and came up with a simple single-path model for storing data on customers, orders, and billing history. He then read the DEFINE manual, which describes how to create a SYSTEM 2000 data dictionary and populate the data base. Because his data was stored in a SAS data set, Ian used PROC S2KLOAD to populate the CBD. Programs 1 through 3 present a before-during-after view of this process. Program 1 output shows the attributes of all 34 variables in the SAS data set. Program 2 shows the batch setup for PROC S2KLOAD. Program 3 output shows the CBD data dictionary. Please note that the dictionary listing was produced using the DESCRIBE command in a SAS procedure called PROC QUEST. This procedure allows you to develop and process SCF commands within the full-screen display manager system that comes with base SAS software.

Program 1  SAS Dataset SAVE.A Contents

**A. Output Sample**

<table>
<thead>
<tr>
<th>CONTENTS PROCEDURE</th>
<th>CONTENTS OF SAS MEMBER SAVE.A</th>
</tr>
</thead>
<tbody>
<tr>
<td>NUMBER OF OBSERVATIONS: 295</td>
<td></td>
</tr>
<tr>
<td>NUMBER OF VARIABLES: 34</td>
<td>MINTYPEI: DATA</td>
</tr>
</tbody>
</table>

**ALPHABETIC LIST OF VARIABLES AND ATTRIBUTES**

1 CITY CHAR 30 20 15.
10 CODE CHAR 8 345 4.
15 COMPANY CHAR 50 53
31 DOCX CHAR 27 591.
21 DS CHAR 32 486.
24 DEAFDAM CHAR 32 436.
25 DEAFDAM CHAR 32 466.
26 DEAFDAM CHAR 32 516.
27 DEAFDAM CHAR 32 536.
28 DEMENE CHAR 18 566.
14 DATE CHAR 8 323 DATETIME.
16 DEFT CHAR 8 345 8.2.
32 ENAM CHAR 32 155 22.
33 ENADCHAR 32 187 22.
34 ENADCHAR 32 219 22.
35 ENADCHAR 32 275 32.
11 ENADCHAR 32 275 32.
12 ENADCHAR 32 285 32.
36 ENAME CHAR 8 376_CONV12.2.
1 ENAMX CHAR 8 8 _SAFETY.
13 ENAMX CHAR 16 315 16.
6 NAME CHAR 50 193 56.
20 NCOMP CHAR 5 576.
31 NCOMP CHAR 5 831.
34 NCH CHAR 20 831.
32 NCH CHAR 13 818.
10 NCH CHAR 8 103.
22 OFFICE CHAR 3 368.
2 PASSCH CHAR 8 12_DATATE.
16 PERIOD CHAR 1 369.
23 PRODCHAR CHAR 20 378.
17 PERIOD CHAR 3 378.
19 PERIOD CHAR 3 378.
33 PERIOD CHAR 5 378.
29 PERIOD CHAR 5 378.
18 PERIOD CHAR 5 378.
19 PERIOD CHAR 5 378.
1 PERIOD CHAR 3 378.
10 PERIOD CHAR 3 378.
7 PERSON CHAR 3 103 3.

B. Code

**PROC CONTENTS DATA=SATE.A;**

**Program 2  PROC S2KLOAD Code**

**PROC S2KLOAD ACCESS=DATA SAVE=A**

**RUN;**

**WANT**

| C1 = NCH /VOL 
| C2 = COMPANY /DATA 
| C3 = CODE /DATA 
| C50 = CODE /DATA 
| C102 = CITY /DATA 
| C103 = STATE /DATA 
| C104 = CITY /DATA 
| C120 = COHOLD /DATA 
| C128 = COMPANY /DATA 
| C129 = COMPANY /DATA 
| C130 = COMPANY /DATA 
| C131 = COMPANY /DATA 
| C132 = COMPANY /DATA 
| C133 = COMPANY /DATA 
| C134 = COMPANY /DATA 
| C135 = COMPANY /DATA 
| C136 = COMPANY /DATA 
| C137 = COMPANY /DATA 
| C301 = PRODCHAR /VOL 
| C302 = REFCODE /DATA 
| C303 = REFCODE /DATA 
| C304 = REFCODE /DATA 
| C305 = REFCODE /DATA 
| C306 = REFCODE /DATA 
| C307 = REFCODE /DATA 
| C308 = REFCODE /DATA 
| C309 = REFCODE /DATA 
| C310 = REFCODE /DATA 
| C311 = REFCODE /DATA 
| C312 = REFCODE /DATA 
| C313 = REFCODE /DATA 
| C314 = REFCODE /DATA 
| C315 = REFCODE /DATA 
| C316 = REFCODE /DATA 
| C317 = REFCODE /DATA 
| C301 = PRODCHAR /DATA 

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Ian wrote some PL/I PLEX programs for front-end entry and editing of data to the CDB. He also instructed several New York office managers and staff members in the use of QUEST, the SYSTEM 2000 data management vehicle. The marketing person at GTL uses SAS/ETS software to forecast series trends for each line in the budget given what she knows of outside (vendor price) and inside (spending policy) changes. The staff accountant uses the SAS spreadsheet, PROC FSCALC (part of SAS/FSP software), for trial balance sheet work. Bonnie uses PROC FSLITTER for mass mailings to sales prospects. And the data center operations manager uses base SAS software and SAS/GRAPH software to chart production and support systems development activities. This use of SYSTEM 2000 processors came out of an Information Center Committee report dated June 1986, one year after Gerry Trucks leasing acquired the software. The procedures for interfacing SYSTEM 2000 to the SAS System had just become available.

Most of the simple ad hoc queries and updates were readily satisfied using PROC QUEST and QuoX (now FSEDIT is available). Report Writer and Genius were employed for reports requiring greater output format control and breakpoint processing. Ian Anderson's staff used PL/I PLEX code for selected data entry, editing, and systems development activities. This use of SYSTEM 2000 was readily satisfied through the FSEDIT option specifying SYSTEM 2000 as the data entry screen development and on-line inquiry work can be done through the FSEDIT option specifying SYSTEM 2000 as the data management vehicle.

The GTL sales department was organized on a territory basis. Bonnie, however, wanted to move to an account basis for the two sales reps serving the New England region. When Gerry Garcia asked why, she gave him a list she produced using the LIST command (see Program 4). Campbell Soup Company and Bethlehem Steel Corporation were making enough use of leased trucks to warrant making those two accounts the province of one sales rep and giving the other ten accounts to the second New England sales rep. Gerry approved the New England office reorganization and asked Bonnie to produce the same listing for the four other sales regions.

Program 4. LIST...WHERE issued Within PROC QUEST

A. Output

```sql
PROCEDURE REMOTE FEES. NEW ENGLAND COMPANIES
09/15/1986
```

```sql
+------ +----------+
| NAME  | INCOME   |
|------- +----------|
| BANKERS TRUST COMPANY | 36225.000 |
| RESCHN INC. | 35700.000 |
| AVISLEON INSURANCE CORPORATION | 76600.000 |
| CAMPBELL SOUP COMPANY | 29170.000 |
| CITY COLLEGE OF NEW YORK | 10350.000 |
| DOWCHESSA COMPANY INC. | 36225.000 |
| EQUITY H.A. | 41160.000 |
| FIRST NATIONAL BANK | 36225.000 |
| HAFABRA DATA INSTITUTE INC. | 36225.000 |
| MULTIVARIANCE DATA ANALYSIS INC. | 39150.000 |
| NEW JERSEY EDUCATIONAL COMPUTER NETWORK | 184150.000 |
| UNITED BRANDS COMPANY | 62100.000 |
| -- FOR CONTRACTS WHICH EXPIRE PRIOR TO DEC 87 |
|------- +----------|
```

B. Code

```
PROC QUEST ACCESS=5;
USER,CDB;
DESCRIBE;
DBN is COB;
RUN;
```

```
100* DOCK (RECORD)
20* COMPANY (CHAR X(50))
30* INDUSTRY CODE (CHAR XXXX)
103* CITY (CHAR X(30) IN (00)
104* STATE (CHAR xx IN (00)
109* DSADDR3 (NON-KEY CHAR X(32) IN (00)
105* DSADDR2 (NON-KEY CHAR X(32) IN (00)
107* DSADDR1 (NON-KEY CHAR X(32) IN (00)
106* SITE NUMBER (NON-KEY CHAR X(8) IN (00)
101* CONTRACT NUMBER (CHAR X(S))
200* PRODUCT (RECORD IN 100)
```

```
1* COMPANY
2* COMPANY
3* COMPANY
102* INVOICE DATE (NON-KEY DATE IN 100)
103* INVOICE NUMBER (NON-KEY CHAR X(5) IN 100)
101* PRODUCT CODE (CHAR X(20) IN 200)
205* BILLING PERIOD (NON-KEY CHAR X IN 200J
203* STARTING DATE (NON-KEY DATE IN 200)
206* FIRST RATE (NON-KEY DECIMAL NUMBER 9(6).99 IN 200J
209* OFFICE (CHAR xx IN 200)
204* CONTRACT REFERENCE NUMBER (NON-KEY CHAR X(10) IN 200)
202* EXPIRATION DATE (NON-KEY DATE IN 200)
207* FAX ADDRESS (NON-KEY CHAR X(100) IN 200)
```

```
A. Output Sample
2000 natural language. After they tried it, several users said they were quite pleased with the speedy response, to their PROC QUEST.
```

```
Ian wrote some PL/I PLEX programs for front-end entry and editing of data to the CDB. He also instructed several New York office managers and staff members in the use of QUEST, the SYSTEM 2000 data management vehicle. After they tried it, several users said they were quite pleased with the speedy response, to their PROC QUEST.
```

```
and asked Bonnie to produce the same listing for the four other sales regions.
```

```
Program 3 CDB Data Dictionary
```

```
A. Output Sample
```

```
```

```
```
customer. There are 70 customers. The SAS data set, on the other hand, is organized around product, so the PROC FREQ output for customer industry shows a cumulative total of 292. When record types match, the distribution of record counts among categories also matches, as evidenced by a comparison of the second TALLY table and the second FREQ table.

Program 5 TALLY on Industry Code and Product Code

A. Output

<table>
<thead>
<tr>
<th>INDUSTRY CODE</th>
<th>OCCURRENCIES</th>
</tr>
</thead>
<tbody>
<tr>
<td>&quot;&quot;</td>
<td>15</td>
</tr>
<tr>
<td>CD</td>
<td>102</td>
</tr>
<tr>
<td>DRUG</td>
<td>113</td>
</tr>
<tr>
<td>&quot;&quot;</td>
<td>15</td>
</tr>
<tr>
<td>&quot;&quot;</td>
<td>15</td>
</tr>
<tr>
<td>&quot;&quot;</td>
<td>15</td>
</tr>
</tbody>
</table>

B. Code

PROC TALLY INDUSTRY CODE, PRODUCT CODE;

Program 6 PROC FREQ on Industry Code and Product Code

A. Output

<table>
<thead>
<tr>
<th>INDUSTRY CODE</th>
<th>FREQUENCY</th>
<th>PERCENT</th>
<th>THEORETICAL FREQUENCY</th>
<th>PERCENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>01-22/11/12</td>
<td>22</td>
<td>39.3%</td>
<td>22.6</td>
<td>40.0%</td>
</tr>
<tr>
<td>02-22/11/12</td>
<td>24</td>
<td>41.0%</td>
<td>24.2</td>
<td>41.0%</td>
</tr>
<tr>
<td>03-22/11/12</td>
<td>14</td>
<td>24.7%</td>
<td>24.1</td>
<td>41.0%</td>
</tr>
<tr>
<td>04-22/11/12</td>
<td>13</td>
<td>22.9%</td>
<td>22.5</td>
<td>41.0%</td>
</tr>
<tr>
<td>05-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>06-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>07-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>08-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>09-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>10-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>11-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>12-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>13-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>14-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>15-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
<tr>
<td>16-22/11/12</td>
<td>15</td>
<td>26.6%</td>
<td>27.4</td>
<td>51.0%</td>
</tr>
</tbody>
</table>

B. Code

PROC FREQ DATA=SAV2.C.;

Program 7 PROC S2K for Extracting Data

A. Code

PROC S2K PM='CDB' DMEM='CDB';

Garcia Truck Leasing is best known on the East Coast. Because the New York and Atlanta offices were running smoothly, Gerry Garcia wanted Bonnie and George to focus attention on the Chicago (Midwest), Dallas (Southwest), and San Francisco (West) offices. Bonnie asked Ian to extract selected fields for these records from the CDB. Ian used PROC S2K (Program 7) to extract these elements and records from the production CDB into a SAS data set called LONG.TRUCKS.
B. LONG TRUCKS Contents

## CONTENTS PROCEDURE

- CONTENTS OF SAS MEMBER LONG TRUCKS
- NUMBER OF OBSERVATIONS: 155
- NUMBER OF VARIABLES: 14
- ALPHABETIC LIST OF VARIABLES AND ATTRIBUTES
  - VARIABLE LENGTH POSITION FORMAT
    - COMPANY CHAR 50 4 50.
    - DOCSUP CHAR 32 90 32.
    - EXCHARGE NUM 0 120 VALUE.
    - POSTAGE NUM 0 130 .2.
    - ENDPAY CHAR 6 24 6.
    - PAYTYPE NUM 0 157 .13.2.
    - OFFICE CHAR 3 147 .2.
    - UPDATE NUM 0 180 VALUE.
    - PRODCODE CHAR 9 RESULT.
    - RIP CHAR 6 165 .2.
    - STATE CHAR 3 112 .2.
    - DATE CHAR 6 58 2.

From Bonnie’s frequency program (Program 6), it was clear that over half (50.5%) of all truck and trailer combinations in the field involved 22-foot trucks. George wanted a regional breakdown of billings for 22-foot trucks. He discovered that about 35% of the three-region revenue came from the lease of 22-foot trucks pulling 12-foot trailers sold through the Chicago office. Upon reviewing the output from PROC TABULATE (Program 8), Bonnie and George agreed that more effort to sell the 22TK/12TR combination was needed out of the Dallas and San Francisco offices.

Program 8 PROC TABULATE for Analysis of 22-Foot Leased Trucks

A. Output

```
TRUCK LEASING INVOICES FOR 22-FOOTERS BY REGION

<table>
<thead>
<tr>
<th>PRODCODE/OFICE</th>
<th>SUM</th>
<th>PAYDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>22TK/12TR</td>
<td>34,256</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>15,987</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>10,487</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>9,084</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>8,713</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>8,713</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>8,713</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>8,713</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>8,713</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>8,713</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>8,713</td>
<td></td>
</tr>
<tr>
<td>22TK/12TR</td>
<td>8,713</td>
<td></td>
</tr>
</tbody>
</table>
```

Note that this program makes use of a function called INDEX. The second statement in Program 8 operates like the CONTAINS keyword of SYSTEM 2000. A nonzero value for the result of the INDEX operation indicates the existence of a prespecified character string. There are dozens of such useful functions in base SAS software for string manipulation, date and time conversion, and mathematical operations. The remainder of Program 8, which consists of the TABULATE procedure itself, has no equivalent in SYSTEM 2000 reporting facilities. Duplication of the output would require at least two passes of the data and many lines of PLEX code.

Bonnie and George agreed on the policy implications of the report on 22-foot truck leasing but needed a way to communicate this to Gerry in under 5 seconds (which is Gerry’s attention span). Bonnie was an old hand at slide and overhead presentations, so she whipped up a graph on 22-foot truck leases in the three western regions. The output from Program 9, “Quarterly Revenue by Region,” took Gerry Garcia 4.2 seconds to digest. He called the Dallas office manager and ordered a promotional campaign on the 22-foot truck line. He then turned to his controller and said, “George, I don’t like these third quarter figures. Please eliminate this quarter from all future reports!”

Figure 1 Quarterly Revenue by Region

*For 22 ft. trucks only
(Sep 85 - Aug 86)
Program 9 PROC GCHART Graph Code

DATA GRAPH22;
SET LONG. TRUCKS;
IF INEX(PRODCODE,'22TK')=0;
IF INVDATE GE '01SEP85'D AND INVDATB LE '31AUG86'D;
X_MONTH=INVDATE;
IF M SQ 12 OR M EQ 2 THEN QTR='1STQTR';
IF 3<=H<=5 THEN QTR='2NDQTR';
IF 6<=H<=8 THEN QTR='3RDOUR';
PROC GCHART;
PATTERN1 V=S;PATTERN2 V_E;PATTERN3 Y="H3L;"
TITLE1 FONT=ITALIC H=1S 'STACKED 90X-2 ' QUARTERLY REVENUE BY REGION';
FOOTNOTE1 FONT_ITALIC H=2 J=L "FOR 22 FT. TRUCKS ONLY";
FOOTNOTE2 FONT_ITALIC A=1 D=Q "(SEPTEMBER - AUGUST)";
LABEL INVDATE='INVOICE DOLLARS';
LABEL QTTR='FISCAL YEAR QUARTER';
LEGEND1 VALUE=(F-XSWISS 'MIDWEST' 'SOUTHWEST' 'SOUTH' J LABEL-NONE
TAAM!;
VBAR QTR DISCRETE SUBGROUP=OFFICE SUMVAR_INVAIIT
RAXIS.O TO 1400000 BY 200000 FRAME
LEGEND=LEGEND1 SPACE=7;
RUN;

PROC GCHART, the SAS/GRAPH software component of Program 9, the SAS/GRAPH component of Program 9, contains several keywords and options. The default graph would have required far fewer options. The coding intensity of this particular project stems from user requirements for flexibility in the selection of color, font, scale, labels, position, and output device. SAS/GRAPH software is extremely popular and, as such, often works as a magnet, drawing SYSTEM 2000 data through PROC S2K into SAS data sets for graphic presentation. This was certainly the case at Garcia Truck Leasing.

Gerry reminded Bonnie and George of the cash flow project. Gerry asked to see the factors associated with late payment on the part of western region accounts. George started the project in early September by examining unpaid invoices. Program 10 shows an accounts aging report George wrote. The large chi-square value indicates some association between account location and days overdue. While over half of the overdue accounts are in the western region, the accounts most delinquent (over 120 days) are concentrated in the Midwest. Bonnie and George agreed that the gap between invoice date and payment date serves as a useful measure of cash flow. Program 10 output indicates that location bears some association with payment lag, but other factors are likely to be at work as well.

Program 10 Account Aging Category by Sales Region

A. Output

<table>
<thead>
<tr>
<th>STATISTIC OF VALUE</th>
<th>NUM</th>
<th>CHI-SQUARE</th>
<th>6</th>
<th>19.341</th>
<th>0.006</th>
</tr>
</thead>
<tbody>
<tr>
<td>LIKELIHOOD RATIO CHI-SQUARE</td>
<td>6</td>
<td>21.732</td>
<td>0.001</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NAMPR-BARTLETT CHI-SQUARE</td>
<td>1</td>
<td>8.636</td>
<td>0.003</td>
<td></td>
<td></td>
</tr>
<tr>
<td>DFI</td>
<td>3</td>
<td>7.970</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CONCORDANCE COEFFICIENT</td>
<td>6.577</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CRAMER'S V</td>
<td>4.126</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SAMPLE SIZE = 35

B. Code

DATA OVIP.DLIL;
SET LONG TRUCKS;
IF PAYDAY=.;
LENGTH AGECAt' , 8;
TODAY_DATE=';
DAYS=ODAY-INVDA'lT;
IF DAYS LT 30 THEN AGECAt-'0-30';
IF DAYS GE 30 AND DAYS LE 60 THEN AGECAt-'31-60';
IF DAYS GE 60 AND DAYS LE 90 THEN AGECAt-'61-90';
IF DAYS GE 90 THEN AGECAt-'91-120';
IF DAYS GE 120 THEN AGECAt-'120+';
PROC FREO;
TABLES OFrIC1.AGECA'l';
TITLE 'ACCOUNT AGING CATEGORY BY LOCATION';
RUN;

For paid invoices, payment lag (DAYS) was measured by comparing the invoice date with the payment date. For unpaid invoices, payment lag was measured by comparing the invoice date with September 6, 1986—the day Ian took a "snapshot" of the SYSTEM 2000 data base using PROC S2K. Bonnie and George
considered several potential causes of payment lag, and then
that analyzed those that were represented in the SAS data set.
Their hypotheses were the following:

1. Customer age—established customers pay more
   promptly
2. House account status—sales reps motivate faster
   payment than do credit department reps
3. Region—the farther from GTL headquarters (NYC), the
   longer it takes to pay
4. Invoice amount—smaller bills get paid faster
5. Customer industry—government agencies are slower to
   pay bills than private sector companies.

Correlation and regression analysis required George to recode
dependent variables. Their hypotheses were the following:

Correlation and regression analysis required George to recode
dependent variables. Their hypotheses were the following:

1. Customer age—Y (year first truck lease signed)
2. House account status—HOUSE (REP v. HSE)
3. Region—REGMW, REGSW, REGW (Midwest, Southwest,
   and Western regions)
4. Invoice amount—INVMT
5. Customer industry—BASIC (agriculture, oil, utilities,
   manufacturing); NONBASIC (banking, commercial,
   insurance, research, retailing, services, private higher
   education); GOVT (government, education).

They were ready to build their model.

George and Bonnie produced some preliminary tables of pay­
ment lag means using these independent variables in a
TABULATE procedure. There appeared to be some differences
among independent variable categories, but the TABULATE pro­
cedure did not indicate which of these were
among independent variable categories, but the TABULATE pro­
cedure did not indicate which of these were
cant. So PROC CORR was used to generate a correlation matrix,
and from this matrix George and Bonnie selected customer age
(Y) and nonbasic industry (NONBASIC) status as potential indica­
tors of payment lag. Program 11 output shows that these two
factors account for 28% of the variance in payment lag.

Program 11 PROC GLM With Payment Lag as the Dependent
Variable

A. Output

Using Program 11 output in conjunction with their tables of means,
George and Bonnie concurred that older customers do pay more
promptly. It was also shown that customers in the nonbasic
industry group are more prompt. They concluded that more work
had to be done by sales and credit reps to communicate the
invoice payment requirements to new customers. Further, a sur­
vey of payment practices in different industries was needed so
that the credit department could more accurately predict cash
flow. The first of these two recommendations was approved by
Gerry; the second was put on the back burner.

It was late Friday afternoon, with Bonnie, George, and Ian in Ger­
ry's office for a review of the recently closed fiscal year. Said
Gerry, "Those third quarter numbers are lousy, but you brought
us through in the fourth quarter, Bonnie. George, we avoided hav­
ing our Frisco garage foreclosed thanks to you. As for you, Ian,
you've got everybody using computers! It's been a long week for
all of us. Tell you what—I know the doorman at Club 21. I'm going
to pick up the tab for a party tomorrow night. Bolshoi is
playing!"