COLLECTION AND RETRIEVAL OF UTILITY DATA WITH SAS SOFTWARE AND DB2

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ABSTRACT

The user-friendliness of SAS FSEDIT and the data manipulation features of the SAS base product coupled with DB2, a relational database product, are tools utilized to collect and retrieve data. Features of the system provide data consistency and control in conjunction with a transparent and powerful data management tool.

INTRODUCTION

Southern California Edison periodically collects data from its various departments for the purpose of filing a rate case. Typically, this involves a mobilization of personnel in several departments and a special group of analysts to assemble, interpret, manipulate, and display the data. In an attempt to automate and facilitate this process, a system for data entry, editing, and query was developed to load the required data to a database. The system was required to be interactive, user-friendly, and provide data access security for sensitive information.

This system utilizes SAS software (for the data manipulation), DB2 (as the relational database to store the data), and TSO (as the user interface). All software is available to an IBM Model 3084 mainframe computer.

SYSTEM OVERVIEW

The system is initiated by a TSO CLIST which calls the main SAS program into execution and makes available a dataset of SAS screens and a control parameter file (Figure 1). A batch job can be run (‘ARCST1.TEST.CNTL(ART001)’) which prints the data contained in all the DB2 tables. When the user has finished processing a particular table, the information is copied to a permanent backup dataset.

CLIST

THE CLIST (Figure 2) initially clears files previously created by the system and allocates several old and new datasets. Print file destinations are specified and a message is displayed to the user while SAS is invoked and the main program executed.

MAIN PROGRAM

Interactive menus are displayed using PUT statements in a _NULL_ data step (Figure 3), until a valid response is input from the screen. Outside the loop, the input variable is assigned to a macro variable so information can be passed on to other data steps.

Since the data which will be input are to be used by other departments, the user needs to communicate his completion of the data entry process for each table. Through a dataset of status indicators (specific to each table), the user designates to others data entry completion versus non-completion (status open or closed, respectively). If the indicator for a table equals ‘0’ (open), the data is downloaded to the SAS environment and passed to the SAS Full Screen Edit procedure. If the same indicator equals ‘C’ (closed), the user may not edit the dataset. In addition, the user is prevented from opening a closed table through FSEDIT maximum and minimum attribute screens. In this way, data control and consistency are achieved. All information fields which require no user input are also preserved using the FSEDIT protection attribute screen. Data is automatically saved after 10 entries to protect against loss and the function keys have been reset to prevent screen modifications. The display is enhanced by associating formats with variables specific to the status dataset (Figure 4).
Of special notice is the structure of the status dataset in the database environment and the system environment (Figure 5). In the DB2 environment, status data is stored as one record per table with 11 variables per record. Rather than forcing user pagination through 30 records in FSEDIT, arrays were used to create one record of 330 variables (which fits on two screens). When the user changes the status of a table from open to closed, the current date is automatically stamped to the completion date field. When the user exits the system, this one large record is transformed back to 30 smaller records. A comparison is made to the original status dataset; any records which have been changed are used to update the status table in the DB2 environment.

A specialized procedure which downloads tables from the DB2 environment to the SAS environment was developed. Update, insert, and delete functions are performed on a DB2 table based on certain 'keys' specific to each table. Key information (as well as format information) is retrieved from the control parameter file based on the user request for a particular table. Once the data has been passed to SAS-FSEDIT, the user may, or may not make changes to the downloaded records (Figure 6). Records from the edited dataset are split into delete, update or insert datasets, depending on the edit activity code input by the user for each observation (Figure 7). The number of records contained in each transaction dataset is ascertained by setting the record pointer to the SAS internal record number _N_ and creating a variable equal to the special variable NOBS. To prevent error messages, the internal variable _ERROR_ is set to 0. The number of records contained in each dataset is passed to a macro variable which is used to conditionally execute the DB2 upload procedure.

Once the user has selected a specific tax table from the main menu, he may print that individual table by selecting the print option from a second menu. Hardcopy of the subset of tables specified is provided quickly since the output is sent directly to the printer (Figure 8). The user may also request hardcopy of all the tables by selecting the print option from the main menu. When the user exits the system (also from the main menu), a batch job is conditionally submitted which produces the reports.

CONCLUSION

The interactive and editing tools available through SAS software coupled with the power of DB2 facilitate the creation of a user-friendly and sophisticated data entry/query tool. Because of the ease of program prototyping, development, and data control, Southern California Edison will continue to devise similar systems.

ACKNOWLEDGEMENTS

1. SAS, SAS/FSP are the registered trademarks of:
   SAS Institute, INC.
   Cary, NC 27511-8000

   DB2 is a registered trademark of:
   International Business Machines, Inc.

2. For information regarding the SAS-DB2 interface:
   Heiike & Associates, Inc.
   18225 Acre Street
   Northridge, CA 91325

3. Special program code developed by:
   Wadler Data Systems, Inc.
   2110 Meadow Valley Terrace
   Silverlake, CA 90039-3535

   Thanks to Anne Olson for design support.

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AUTOMATED RATE CASE SYSTEM
TAX DEPARTMENT MAIN MENU
RECORDED TAXES

1. USE TAX
2. CAPITALIZED A & G
3. FEDERAL, MISC, CAL PAYROLL TAX
4. HAZ WASTE & MISC PROPERTY TAX
5. SUI PAYROLL TAX
6. AD VALOREM TAX & TAX ADJUSTMENTS
7. PROPERTY VALUES
8. STATE PROPERTY & INCOME TAX RATES
9. ITC
10. TPA
11. TEFRA AMOUNTS
12. REMOVAL COST
13. ACCELERATED AMORTIZATION & GAIN/LOSS ACRS & LAND AMORTIZATN
14. DEFERRED ACRS
15. TAX DEPRECIATION SUMMARY
16. TAX DEPRECIATION DETAIL
17. FEDERAL INCOME TAX
18. FEDERAL INCOME RATE TAX
19. STATE INCOME TAX
20. OTHER SCHEDUL M ADJUSTMENTS
21. TAX WORKING CASH
22. STATE TAX WORKING CASH
23. MAC CLAUSES
24. OPER REVENUE & EXPENSE & 074
25. PAYROLL & PROPERTY

PLEASE ENTER OPTION

Figure 3.

AUTOMATED RATE CASE SYSTEM
TAX DEPARTMENT MAIN MENU
RECORDED TAXES

1. USE TAX
2. CAPITALIZED A & G
3. FEDERAL, MISC, CAL PAYROLL TAX
4. HAZ WASTE & MISC PROPERTY TAX
5. SUI PAYROLL TAX
6. AD VALOREM TAX & TAX ADJUSTMENTS
7. PROPERTY VALUES
8. STATE PROPERTY & INCOME TAX RATES
9. ITC
10. TPA
11. TEFRA AMOUNTS
12. REMOVAL COST
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22. STATE TAX WORKING CASH
23. MAC CLAUSES
24. OPER REVENUE & EXPENSE & 074
25. PAYROLL & PROPERTY

PLEASE ENTER OPTION

Figure 4.


RETAIN 1 0;

INITIALIZE I TO 0

SACRE DATABASE ARRAYS FOR X* CONVERSION

ARRAY ABLNAME (1) 60 TBLNAME-TABNAM25;
ARRAY ASTATUS (1) 60 STATUS1-STATUS25;
ARRAY ACMPDATE (1) 60 DATCMPI-DATCPART25;
ARRAY ACUTOFF (1) 60 CUTOFFI-CUTOFF25;
ARRAY AOFFCUT (1) 6 OFFCUT1-OFFCUT25;
ARRAY BUZDATE (1) 6 BZIDATI-BZIDAT25;
ARRAY AUSRNAME (1) 20 USRNAMI-USRNAM25;
ARRAY NUMTAB (1) 2 NUMTAB1-NUMTAB25;

INIT NEW ARRAYS TO BLANKS

RETAIN BUZDATI-BZIDAT25
RETAIN CUTOFFI-CUTOFF25
RETAIN STATUSI-STATUS25
RETAIN BUZNAME-USERNAME
RETAIN BUZDATE-USERNAME
RETAIN BUFNAME-CMPODATE

SET STATDATA END =EOF; SYNUMIRAT;

DROP APPLIEND VERSION FILETYPE;

IN MARK THE END OF FILE

BY NUMERTAB;

IF EOF THEN OUTPUT;

RETURN;

Figure 5.

Command ==> EDIT SAS data set: WORK.ARTR140T

Screen 1

AUTOMATED RATE CASE SYSTEM
EDIT SCREEN FOR ARTI LIST
Hazardous Waste & Misc Property Tax

For Type tax: 2504 LOCAL RICE PROPERTY TAX

Edit Activity:
'("C"=Change, "D"=Delete)

Month: DECEMBER
Year: 1985
State / Federal Indicator: STATE
(S=State, F=Federal, B=Both)

Amount: 99,999

State Making Adjustment: 0

PF1=HELP PF3=COMET PF7=PREVIOUS RECORD PF8=NEXT RECORD PF9=NEW RECORD

Figure 6.
<table>
<thead>
<tr>
<th>STATE/FEDERAL</th>
<th>INCOME IDENTIFIER</th>
<th>SCHEDULE AMOUNT</th>
<th>RATE MAKING AMOUNT</th>
<th>TYPE/TAX DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOTH</td>
<td>5501</td>
<td>0</td>
<td>0</td>
<td>AUCF</td>
</tr>
<tr>
<td>FEDERAL</td>
<td>5502</td>
<td>0</td>
<td>0</td>
<td>ACRA GATH / LOSS</td>
</tr>
<tr>
<td>BOTH</td>
<td>5503</td>
<td>0</td>
<td>0</td>
<td>CEAC</td>
</tr>
<tr>
<td>BOTH</td>
<td>5504</td>
<td>0</td>
<td>0</td>
<td>CLMAC</td>
</tr>
<tr>
<td>BOTH</td>
<td>5505</td>
<td>0</td>
<td>0</td>
<td>COAL PLANT INCENTIVE PROGRAM</td>
</tr>
<tr>
<td>BOTH</td>
<td>5506</td>
<td>0</td>
<td>0</td>
<td>CONSERVATION HARDWARE RESALE</td>
</tr>
<tr>
<td>BOTH</td>
<td>5507</td>
<td>0</td>
<td>0</td>
<td>CONSERVATION CONTINGENT FUND</td>
</tr>
<tr>
<td>BOTH</td>
<td>5508</td>
<td>0</td>
<td>0</td>
<td>EARNINGS LIMITATION CAP</td>
</tr>
<tr>
<td>BOTH</td>
<td>5509</td>
<td>0</td>
<td>0</td>
<td>EAC</td>
</tr>
<tr>
<td>BOTH</td>
<td>5510</td>
<td>0</td>
<td>0</td>
<td>EXHIBIT WASTE WATER LINE AGREEMENT</td>
</tr>
</tbody>
</table>
| BOTH                  | 5511              | 0               | 0                 | FERC COMPLIANCE AUDIT ITEM NO.  
| BOTH                  | 5512              | 0               | 0                 | FERC Docket No. 6401-177  |
| BOTH                  | 5513              | 0               | 0                 | FIXED CHARGES        |
| BOTH                  | 5514              | 0               | 0                 | FUEL CELL METER-OFF  |
| BOTH                  | 5515              | 0               | 0                 | FUEL_php              |
| BOTH                  | 5516              | 0               | 0                 | GENERAL             |
| BOTH                  | 5517              | 0               | 0                 | INTEREST CHARGES     |
| BOTH                  | 5518              | 0               | 0                 | INTEREST CHARGES     |
| BOTH                  | 5519              | 0               | 0                 | LTB TCN MORT INTEREST INCOME |
| BOTH                  | 5520              | 0               | 0                 | MAC                  |
| BOTH                  | 5521              | 0               | 0                 | MAPPING EXPENSE AMORTIZATION |
| BOTH                  | 5522              | 0               | 0                 | METER BILLING CHARGES IN AUC |
| BOTH                  | 5523              | 0               | 0                 | NUCLEAR FUEL LEASE INTEREST GA |
| BOTH                  | 5524              | 0               | 0                 | NUCLEAR WASTE POLICY ACT |
| BOTH                  | 5525              | 0               | 0                 | PENSION RESERVES     |
| BOTH                  | 5526              | 0               | 0                 | RESALE DECISION 79-1155 |
| BOTH                  | 5527              | 0               | 0                 | RESALE DECISION 79-162  |
| BOTH                  | 5528              | 0               | 0                 | SALVAGE HARBOR EXPENSE |
| BOTH                  | 5529              | 0               | 0                 | SALVAGE RECOVERY       |
| BOTH                  | 5530              | 0               | 0                 | STEEL SUBSTITUTE ADJUSTMENT CLA |
| BOTH                  | 5531              | 0               | 0                 | UNCOLLECTIBLE ACCOUNTS RESERVE  |
| BOTH                  | 5532              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5533              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5534              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5535              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5536              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5537              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5538              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5539              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5540              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5541              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5542              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5543              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5544              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5545              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5546              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5547              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5548              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5549              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5550              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5551              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5552              | 0               | 0                 | COOL WATER           |
| BOTH                  | 5553              | 0               | 0                 | COOL WATER           |

**Figure 7.**

**Figure 8.**