PC SAS: Management Reporting Using Data From External Sources

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ABSTRACT
This paper describes the use of the SAS System for PCs to transfer data from external sources and do management reporting. Discussion will focus on the development of a decision support system in a large health maintenance organization. Areas covered will include general experiences and problems concerning the collection, processing and dissemination of information.

Introduction

Health Services Medical Corporation (HSMC) is a health maintenance organization (HMO) servicing Central New York and the Southern Tier of Central of New York. HSMC owns and operates two lines of business which are group model HMOs, one in the Syracuse area and one in Utica, New York. HSMC also manages two independent practice association (IPA) HMOs which are owned by Blue Cross and Blue Shield of Central New York. In total, HSMC is responsible for managing the care of approximately 100,000 individual members.

Managing the care of 100,000 members involves a sizeable amount of data processing. During a given year we may process 880,000 encounters and claims from our primary care physicians, referral physicians, area hospitals and other vendors. The HSMC Medical Systems Department is responsible for conducting several types of management reporting including utilization, fee schedule, and financial analysis using encounter and claims data. The Medical Systems Department, in conjunction with the HSMC MIS Department has developed a process for transferring information from external sources (two mini-computers) to an IBM compatible computer for analysis and dissemination of information.

Claims and Data Processing

All data for patient encounters in our group model HMO are processed on a Digital Equipment Corporation Micro VAX 3600(R) (MV 3600). We also maintain our online reservation system on the MV 3600. The MV 3600 uses the VMS(R) operating system as a host to a MUMPS(R) operating system and software.

Encounter and claims data for our independent practice association primary care physicians and all referral physicians are processed on an ULTIMATE 7200(R) computer which uses the PICK(R) operating, and claims processing software distributed by CSC COMTEC. The only communication between the MV 3600 and the ULTIMATE computer is through the transfer of ASCII files on 9-track tape.

Research Before the SAS System

Prior to using the SAS System to do research, most reporting was done by the HSMC MIS Department. Reports consisted mainly of encounter and claims data summarized by type of service or insurance risk pool. The results of the MIS summary reports were then posted to LOTUS(R) spreadsheets for further manipulation, analysis and presentation. There were a number of problems with this process.

Along with limitations in the volume of data that you can manage in this fashion, manually posting information from MIS reports to spreadsheets was time consuming and there were usually key punch errors. A second type of problem would occur when summary reports warranted further investigation of the data. This necessitated a second round of data requests for detail reports and much more printed output from our MIS Department. A third type of problem resulted from limitations in the complexity of analysis available with spreadsheets. The two predominant problems here were limitations in summarizing data and sorting with more than two sort variables.

Finally, when doing exploratory research or "what if" analysis the process of requesting summary and detail reports from MIS and posting results creates a tremendous burden on the MIS system (personnel and computer resources). This burden usually causes tension between MIS and the Medical Systems Department.

Data Transfer From MIS To Medical Systems

Recognizing the need to transfer and analyze data more efficiently the corporation committed the resources to purchase the SAS System(R) for the Medical Systems Department and software for downloading data from the ULTIMATE 7200 (PK HARMONY(R)) I installed the SAS System on a Medical Systems Department IBM compatible PC and our MIS Department installed PK Harmony on an MIS PC and the ULTIMATE 7200.

The PK HARMONY software enabled the MIS Department to download ASCII formatted data files from the ULTIMATE 7200. The PK HARMONY download software is not available for the MV 3600, so data from the MV 3600 can not be downloaded directly to the PC. Data from the MV 3600 must first be written to 9-track tape and transferred to the ULTIMATE 7200.

PK HARMONY provides the option of downloading files in several formats including ASCII and LOTUS formats. I had the MIS Department download the data in ASCII format since the SAS System will read ASCII files and there are more steps involved in converting LOTUS formatted data to SAS data files. To convert LOTUS files to SAS files you must first use LOTUS utilities to convert the files to DIF format and then use SAS PROC DIF to read the DIF files. You also need to identify the variables being transferred from the LOTUS file since PROC DIF gives the variables generic names based on column location (COL1, COL2, COL3 etc...).

SAS As A Data Management And Research Tool

Having the SAS System has allowed us to overcome most of the obstacles we had encountered using spreadsheets to do analysis. We had problems dealing with large volumes of data, using the SAS System we are able to manage large files more effectively. All limitations in complexity of analysis (summarizing, sorting and conditional logic) are eliminated because SAS System provides procedures for summarizing and reporting on data while also providing the power and flexibility of a programming language.

One of the first projects where we transferred a large data file from one of the MIS mini-computers to the Medical Systems Department PC was our study of health center utilization. Here, our MIS Department downloaded a 78,000 record file containing data for twelve months of utilization in our six health centers.

The data was extracted from the MUMPS system on the MV 3600 and written to 9-Track tape in ASCII format. The ASCII file was then transferred to the ULTIMATE 7200 mini-computer. Using the PK HARMONY software resident on the ULTIMATE 7200 and the MIS PC, the ASCII file was downloaded to the MIS PC. After the file was downloaded to the MIS PC the MIS staff wrote the file to diskette using the DOS BACKUP utility. Once the file was on diskette I then used the DOS RESTORE utility to move the data to the hard drive on the Medical Systems Department PC. After the ASCII file was on my hard drive I used a SAS input statement to read the data.

Downloaded data elements included health center, provider identification, procedure code, charge amount, payment source and frequency. With these data elements I was able to analyze health center utilization and provide upper level management quick access to useful information. Most of this analysis involved basic data step logic and summarizing of data.

A second and more ambitious project we were able to complete using the SAS system on our PC was the analysis of encounter and referral claims data for our Syracuse IPA HMO. Twelve months of encounter and referral claims data was extracted from the claims system on the ULTIMATE 7200. This file contained approximately 300,000 records and we estimated that it would require 25 megabytes of storage space so we installed a 70 megabyte disk drive in the Medical Systems PC (in addition to the existing 40 megabyte drive). Along with the disk storage of the 70 megabyte disk drive we installed an EVEREX(R) tape backup device capable of storing up to 60 megabytes of data per tape.

To transfer the 25 megabyte file from the minicomputer to the Medical Systems PC we eliminated the intermediate step of downloading to the MIS PC and downloaded directly to the Medical Systems PC. After backing up the ASCII file I read the data and created several smaller more manageable SAS files.

Using this data I was able to do management reporting and conduct analysis of simulated payments of claims to determine the impact of adjusting our reimbursement fee schedules.

Problem Areas

There are some areas where we are still experiencing problems in data and management reporting. Most of these are not problems with the SAS System. One problem area is data storage, we run out of disk storage. This is a hardware issue where the SAS System can be very useful. Here, the SAS System allows us to create more manageable summary files.

Another problem area is memory. We encounter memory problems when summarizing data using class variables with many class values, or sorting with many sort variables. To remedy this problem we increased our memory capacity. Another quick fix for the memory problem with summaries is to use a "BY" statement.

Finally, a problem that has developed since we started using the SAS System is increased demand for Medical Systems Department services. This is actually less of a problem than an opportunity to better service corporate needs. One way that we meet this demand while maintaining productivity is to create summary files (to user specifications) and transfer these files to users as LOTUS worksheets. This allows the user some flexibility to do further analysis and alter the presentation of the data without placing an additional burden on the Medical Systems Department.

Conclusion

The SAS System has provided HSMC with the capability to manage large amounts of data from two external sources, conduct research and produce management reports. This research and reporting has become a major benefit to the corporation. As a result of increasing demand for these services we are quickly outgrowing the capabilities of our current system and anticipate upgrading our system to improve processing, memory and storage.