

Integrating SAS® Software into a Telephone Information Retrieval System(TIRS)

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Abstract

One of the hottest new technological advances involves the use of telephones to interact with computers and retrieve information. Members of the financial industry develop and use such systems to provide over-the-phone services such as balance inquiry, current loan rates, etc. Until recently, other industries have not employed such technology.

Washington Gas, a Washington D.C. area utility company, and CSC Professional Services Group have made a breakthrough, developing a Telephone Information Retrieval System (TIRS) that uses SAS/AF® and SAS/SHARE® software to retrieve up-to-date information on participants in Washington Gas' energy conservation programs. Residential customers who apply for energy conservation incentives can call the TIRS to check the status of their incentive application. This service is normally available 24 hours a day, whenever the Washington Gas mainframe is available.

This paper describes how Washington Gas' TIRS uses SAS/AF and SAS/SHARE software to provide information retrieval services for multiple users even during concurrent data entry activities.

Introduction

As part of mandated conservation programs, Washington Gas offers its clients incentive rebates to replace their low efficiency, gas/oil/electric equipment with high efficiency, gas equipment. Washington Gas customers and potential customers can apply to receive a cash rebate to offset the additional cost of higher efficiency equipment. The program is limited to selected equipment (for example, space heating equipment). After verification of installation and efficiency rating of the equipment, Washington Gas mails a rebate check to the customer.

Washington Gas and CSC developed the Telephone

Information Retrieval System to assist applicants by providing them access to the current status of their rebate applications at any time; even after business hours, on weekends and on holidays. Washington Gas provides this service as part of their 'Hotline' service that provides information about the conservation programs.

Configuration of Washington Gas' TIRS

Like other Telephone Information Retrieval Systems, Washington Gas' TIRS is comprised of three (3) main components:

1. communications hardware that accepts calls and controls the interface between the caller and the information database,
2. a database of application status, customer demographics, etc., and
3. software to perform information retrieval.

Washington Gas' TIRS is unique because it uses the SAS System to maintain and retrieve information. Also, this TIRS provides multiple users with concurrent access to that information. In fact, this TIRS allows continuous updating of the information database even during the retrieval activities of TIRS and other users.

This merger of communications technology and SAS software results in the most up-to-date information being available at any time of any day, to any Washington Gas client, from anywhere there is a Touch-Tone telephone. The only restrictions are that users can retrieve only information about their account.

Communications Hardware - Conversant Voice Information System

The Conversant Voice Information System is a

communications hardware/software package developed by AT&T. The Conversant has the ability to accept telephone calls, vocalize previously recorded phases and emulate a computer terminal while interfacing with a host computer.

The Conversant (and thus, Washington Gas's TIRS) can be accessed by dialing the 'Hotline' number using any telephone capable of generating tones when its buttons are pressed. Inquirers press buttons to:

1. select an option,
2. answer simple multiple choice questions (for example: questions to be answered Yes or No),
3. enter account numbers.

The software supplied with the Conversant includes functions that can generate keystrokes and can interpret information that is normally displayed on the terminal screen. After calling into the Conversant, the Conversant establishes a connection with the mainframe, starts a terminal session and invokes the information retrieval software.

Information Database

Washington Gas' Least Cost Planning library of SAS data sets is used store information on the participants (and applicants) of the conservation programs. The library includes:

1. a primary/control file that contains the identification of each participant, and a description of each program in which the participant is applying for an incentive rebate;
2. Over 20 program files, each containing application information for one conservation program; and
3. numerous utility files used to control information retrieval, data entry, report generation, etc.

In addition, there are numerous non-SAS data sets that contain macros, source code, JCL statements, etc.

Information Retrieval Software

Washington Gas uses the DC Least Cost Planning System (DCLCP) to enter and retrieve information

about Washington DC residents applying for participation in various conservation programs. The DCLCP uses a series of SAS/AF screens to present menus of options and control execution of the system functions. SAS/FSP screens (primary PROC FSEDIT) perform most data entry functions. SAS/AF or SAS/FSP screens (including PROCs FSBROWSE and FSLIST) handle the information retrieval.

The retrieval software used by the TIRS is incorporated into the DCLCP System. In fact, after logging onto Washington Gas' mainframe, the Conversant invokes the TIRS Status function of the DCLCP System. This function provides information about the status of an application. Non-TIRS users can invoke this function; even while TIRS users are employing the function.

The retrieval of status is accomplished by an SAS/AF screen. You must identify which conservation program and a valid (current) Washington Gas account number. The Status function programs will check to see if the account number is for a participant of the indicated conservation program. If not, a 'non-participant' message is displayed. If the account number is for a participant, the latest status for that participant and program is displayed. The status can be:

1. application received,
2. audit/verification process requested,
3. incentive payment denied,
4. incentive payment approved,
5. incentive check requested, and
6. incentive mailed.

Along with the latest status, the TIRS informs the caller of the latest date for that status. For privacy purposes, no other information is released; not even name, address or even the amount of the incentive.

Which Programs Can the TIRS Access?

At this time, only residential programs can be accessed by the TIRS. Using the TIRS, residential clients can access the residential conservation program; one account/program at a time. Although Non-residential clients do inquire about the status of their applications, they often inquire about the status of multiple programs at one time. Designing a method that would allow callers to identify multiple programs and possibly, multiple accounts for each program did not seem worth the effort. It was

deemed to be too complicated for a telephone interface. However, non-residential (and residential) clients can speak with a Washington Gas staff member to inquire about the status of their application(s).

Using of SAS/SHARE to Reduce Access Conflicts

The SAS/SHARE product makes it possible for data entry personnel to enter application information at the same time as others are trying to retrieve information. Even batch jobs can be submitted to produce reports at the same time as others are accessing (even updating) the DCLCP files.

SAS/SHARE is a server that monitors access to all SAS libraries that were allocated for the 'REMOTE' engine. If SAS/SHARE detects two or more processes attempting to exclusively lock the same observation of a data set, it will either cause one process to wait a short while for the other to release the observation, or, such as the case PROC FSEDIT users, SAS/SHARE immediately informs the user that another process has exclusive access to that observation.

SAS/SHARE only controls access to SAS libraries. You can use the LIBDEF macro provided with the SAS/SHARE product to allocate SAS/SHARE data sets. Or, you can use a LIBNAME statement specifying the REMOTE engine.

The LIBDEF macro allocates all SAS data sets referenced in any of the Base SAS source code of the TIRS. All SAS data sets referenced in the Screen Control Language (SCL) programs of the SAS/AF or SAS/FSP screens are allocated with functions that specify the REMOTE engine block.

Because SAS/SHARE can monitor the allocation of SAS libraries in batch jobs and interactively, reporting jobs (that do not update the DCLCP files) are submitted at any time, even during peak usage hours. However, batch jobs that update the DCLCP files must establish an exclusive 'lock' on each observation being updated. And when an interactive user enters data via a PROC FSEDIT screen, the system automatically establishes an exclusive 'lock' on the observation being edited. These two access requests conflict and often result in the batch jobs 'abending' or user's terminal session being 'hung-up'. To avoid

these conflicts, batch update jobs are run late at night when interactive PROC FSEDIT users are 'off' the system.

Even TIRS users, who only retrieve information, can cause short-lived conflicts. The SAS/AF screens that perform the retrieval request 'non-exclusive' access of DCLCP files. This can cause a short-lived conflict with batch jobs that update the DCLCP files. After the information is retrieved, access to the files is released. Thus, TIRS users can retrieve information even while batch update jobs are running. The amount of time a batch job will wait for resolution of an access conflict (we've seen wait of about 2 minutes) is usually much longer than the time required to retrieve the information.

In addition to using SAS/SHARE, we've other steps to reduce and/or eliminate access conflicts:

1. Two macros perform all file allocations (e.g. LIBNAME statements/functions), one for Screen Control Language (SCL is used with programs for SAS/AF, and SAS/FSP screens) and the other for Base SAS source code;
2. the allocation macros contains code to retry upon failure and to display a failure/retry message;
3. most file allocations request 'shared' access;
4. requests for 'exclusive' access is kept to a minimum;
5. all interactive programs were designed to 'open' and 'close' any necessary file(s) as quickly as possible (for example, to perform a table lookup, the program would 'open' the file for 'shared' access, search for the desired data value, 'close' the file and finally, report the result of the search).

Hints and Notes

Note, SAS/SHARE must have exclusive access to a SAS data set even if the user only request READ ONLY access. Using LIBNAME statements without the REMOTE engine (even when specifying DISP=SHR) to allocate SAS libraries causes conflicts with SAS/SHARE if any user attempts allocate the library as a SAS/SHARE data set.

Conclusion

The Washington Gas TIRS can and has helped many users obtain information about their incentive rebate applications even after business hours. Similar systems can be developed for other industries. The secret is the use of the SAS System. Using SAS software, we were able to take the code used by interactive users, modify it slightly and make it available to the TIRS. This software was easy to design and implement. Also, maintenance has been nominal.

With SAS/ACCESS®, the information database can be something other than traditional SAS libraries.

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