Abstract
Purchased or in-house designed human resource systems seldom have the flexibility to adequately manage the human resource from a data standpoint. However, SAS, with its report, statistical, and database capabilities can aid the human resource professional in managing the resource with ease, flexibility and security. This paper demonstrates ways that SAS can be used to develop a user friendly database structured for the human resource function.

In the field of human resources, personnel information is normally obtained from one of three systems: a software package from a human resource information system vendor, a personnel system designed by the company data-processing department, or from a large bank of file cabinets in the personnel clerk's office. Personnel data systems are the lifeblood of the human resource environment. They tell who is on the payroll, who has and doesn't have the proper training, who is overpaid and underpaid, who has quit and how that compares to the total population, etc. To effectively manage the human resources, the human resource professional needs information. Most of the information needed is in the computer system, yet many systems are not designed to provide for many of the needs of the human resource professional (HRP).

A human resource information system needs several qualities. The system must provide for data entry, data maintenance, standard reports or other types of needed output, and upgrade capabilities. Throughout all of these features, the system must also be absolutely reliable. Consider how anyone would feel if their paycheck was wrong. However, HRP's run into situations where all of the above features are not enough to run the department.

To illustrate the problem, consider first the two different types of systems available. First, the purchased software package.

Purchased Systems
In just about every magazine dealing with the human resource, there are ads describing some great software package that helps HRP manage the human resource. They provide a spectrum of services from standard personnel listings to complete Compensation Analysis reports. Most of these services provide a list of the types of reports and analysis available, many allow some modification to the basic package, and some will even provide the computer or access time, maintenance, and individual customization of your system to your needs.

Surely, if the current system is file cabinets, this alternative is a good way to retrieve the information needed to manage the human resource or at least to find out how many employees are on the payroll without having a clerk count the folders.

In-House Provided System
Most large companies have a human resource information system provided by the data processing department. These systems in themselves range from payroll system to a flexible database system covering the many needs of the human resource professional. These systems have documented procedures for data input, maintenance and system upgrades. Several reports are produced with varying regularity as the needs are established. These systems are carefully designed and generally effective but large systems carry a lot of inertia and are difficult to move when special applications or reports are needed in a hurry.

Examples of Needs
To illustrate these types of systems in a real-world human resource environment, consider a couple of examples of need. The company personnel manager is in the middle of an Affirmative Action review by the Office of Federal Contract Compliance. They ask for information regarding the company promotion activity over the past three years broken out by protected categories merged with Census and Standard Metropolitan Statistical Area data complete with percentages. No data processing department designed system could have ever thought that data would be needed in that format.

Another situation. The Vice President of Human Resources was asked to address a luncheon of college and business leaders on the impact of the company tuition assistance programs on the job performance of the employees. To address the impact, he needs to know the relationship between job performance and participation in the company tuition assistance program. Further, he needs to know how their performance compares to those who do not participate in the tuition assistance program.

In each of these situations, standard reports from either a purchased software system or in-house designed system cannot possibly data quick and easy. Yet, in each of these examples, several requirements for a responsive system was evident. In these illustrations time was an important constraint as was flexibility, ease of use, etc., including the possible future success of the job of the human resource professional.

The human resource, therefore needs some extra capabilities that are not in the standard system such as flexibility, ease of use, quick turn-around time, flexible output and analysis capabilities.

Both of these situations require flexibility in the personnel system to allow a HRP user the ability to create the type of reports needed and
to provide the statistical analysis needed to manage the human resource. Without this flexibility, several hours can be spent compiling data from various standard reports with one result: one report costing several manhours. Yet, in all likelihood the report may never be needed in this format again which increases the cost of generating the report.

If a new report or new programming is ordered, another problem develops when there is a possibility that a requirement for the data in this particular report/format may be needed again. The data processing people are are approached about generating a new standard report, hours are spent in developing the report, the report comes out every month, but it may only be used once a year, if then. A great deal of computer time and paper is wasted on standard reports that are generated by this method. All that is needed to simplify this process is an easy way to blend all the human resource data into a system that can then be used to obtain the output as, and only when needed.

Some kind of language or system is needed that is easy to use and doesn't take a long time to program the type of report that is needed. Languages like Cobol or Fortran are just too difficult to use to program with any ease in a short amount of time. True, some of the new database software available allows easy report writing, but what about database flexibility. They may be easy to use, but don’t have the necessary system flexibility needed for the Human Resource.

Greater flexibility is needed on how the data comes out of the computer. With the new laser printers, the capability for very professional output is available. The key in this situation is an example statement of "I can duplicate that hand written report."

Another difficulty is in the field of statistics. The data processing people can never create a report that runs through the iterations of statistics needed to truly discover how the data represents what is happening in the environment. This type of statistics work requires a software package that has excellent statistics capabilities with a minimum of effort.

Unique in the second situation is that data is required that few personnel packages would ever design into a system or programmed into data processing system. Yet this data can prove useful for situations mentioned above such as justification of why such a tuition assistance program would be worth having for a benefit. The difficulty lies in tying up the expensive resources of the data processing people for something so small and seemingly insignificant. The cost is just too high for the value.

SAS Has The Answers

Though both the purchased and in-house systems are useful and we certainly could not manage without them, the previous examples and problems show that something more is needed than the standard system. The human resource information requirements can be managed with much greater flexibility, ease, speed, and confidence than ever before by using SAS. SAS allows us to expand the limits of the typical purchased or in-house system. To describe just how useful SAS can be, this paper will illustrate some of the problems with basic personnel systems. For the sake of example, we will assume a computerized personnel system that has been designed by the company data processing department which contains the medium for collecting and updating the data.

SAS With The Human Resource System

To help illustrate what can be done with SAS in mainframe human resource system environment, I can only relate a few of the applications we have used with the mainframe system of our company. I hope that my experience can provide some insights for others looking for alternatives for their business applications.

Big Is Not Always Better

When our company human resource function began, the experience of trying to break away from the 100% DP system and began to develop our own report generation capabilities, we discovered some good and some bad in our data processing world.

One advantage was the size of our mainframe. The in-house system was very large allowing a great deal of processing capabilities.

We found the Human Resource System created by our DP people was well designed and was supported by six full time programmers. Consequently, the system was very reliable and had a great deal of data contained in it.

We also found a very prodigious report system containing reports ranging from the very useful to pure trash. The number of reports available ran into the several hundreds.

Finally, we found a system tightly controlled by the data processing with an attitude of, "Only we can do data processing here. You want something out of the computer, we will get it for you."

Pre-Programming Preparation

Once we found out what we were up against, we began our effort to get system going. In the process, we learned some things about how to do it. The following is examples of our learning.

Prior to any work on the computer, some essential preparation needs to take place regarding system requirements, hardware availability, operating system software, data security, data storage, and availability of output.

The first action that needs to be taken is the systems design. The HRP needs to sit down and determine just exactly what is needed to manage the human resource and what is not available from the DP system. What extra databases are needed in addition to what is currently stored, what types of reports are needed, what kind of analysis is needed. Without this type of roadmap available, the rest of the activities are very difficult and
will require a great deal of work in the future to correct the mistakes from poor planning.

The next and obvious step is to determine whether the hardware and software is available for the task. Users need to have access to the hardware that is easily accessible and convenient to use. The ideal would be to have a terminal at every desk. A laser printer and plotter for the department would be very desirable in order to take advantage of the printing and graphics capabilities of SAS.

The operating system software is also important to determine what capabilities of SAS can be utilized. Examples would include—what type of editing capabilities are available in the system, what sort program is used with SAS, which of the SAS options are available on the system, and can SAS be used to program system software.

When the hardware is available, the next important concern is data security. In the personnel field, the data is usually highly secured and access to it is usually difficult. Approvals for access to secured need to be made in advance of understanding the data contents or designing the system.

Historical research on the personnel data is very helpful. Systems always change and what those changes are and how they were made can make a lot of difference on what to read and how to read it. For example, all systems have special codes and with each change in the system, the codes can change or the meaning of the same codes can change. Fortunately, SAS is flexible enough to read just about any type of input data into the system for quick data storage. Once the usable data files have been identified, experience has shown that the most effective way to handle all repeated accesses to certain data files is to load those most often used data elements into SAS datasets. Access to these datasets can be protected by passwords, if necessary. For example, data elements such as name, employee number, department, occupation code, exempt/non-exempt status, hiredate, etc., would be loaded into a SAS dataset for quick access.

Other categories of data that are frequently required should also be loaded. Salary, performance ratings, promotions and other sensitive compensation information could be put in a password-protected dataset. Educational data, employee history and organizational position, etc., would each have a dataset.

Each of these datasets can be maintained and kept up-to-date by one set of users and accessed by a different set of users. For example, even though the training department keeps track of the training data, the compensation users might also need the data to analyze a promotional opportunity. The screen illustrated in Figure #2 can be used to access SAS/FSP with a few simple keystrokes. The clist provides any instructions the users need to access the data. The clist is very important in the process of accessing SAS/FSP with a few simple keystrokes. The clist provides any instructions the users will need for getting into the system, allocates the files, sets the printer parameters, executes SAS, and executes the FSP commands to get into the browse environment. For example, the instruction for getting into this dataset screen after logging onto the computer is simply:

Ex (pay) <return>

The clist that executes this program is in Figure #3.
The history file is composed of a listing by employee of all activities for an employee such as promotions, merit increases, transfers, name changes, address changes, department changes, etc. The data is maintained by Data Processing and can have over a hundred observations per employee. However, the contents of the SAS dataset can contain as many of the history observations as desired. The following example of a history file screen format contains the last fifteen employee activities (see Figures 4a & b).

Data Entry Screens

The same type of clist and SAS/FSP data entry screen can be created for data input. Often the user in a non-data processing environment is a clerk or office assistant that does not know a great deal about computers. If a database has been created and data needs to be added, formatted input screens can be accessed through a simple clist command to allocate files and execute SAS/FSP to input the data, i.e. minimums, maximums, and initial values. These input limits can make data entry virtually error free.

The screen contained in Figure 4b is for data entry to the tuition refund dataset. This data tracks the courses, colleges, grades, and costs of the company tuition refund program. From this dataset, reports can be generated to report refunds due to Finance, reports to management on participation, analysis on participation mentioned above, and can be combined with any of the other datasets for comparative analysis.

Executive Development Program

Finally, all Human Resources Professionals are interested in who the top employees are - the "fast trackers". Every large organization should have a way of tracking their top employees. With SAS/FSP, this type of tracking program can be easily handled. One of the uses of SAS/FSP comes with the need to identify the most qualified employees eligible to fill a top-level position. This usually requires the king of fast turnaround that SAS provides as well as the flexibility to format the data in a way understandable and useful to the user, and the ability to query the system to find what information needed.

A SAS dataset which combines data from several of the primary databases is updated, a program can be run to update the executive database using the UPDATE Data command. The remaining data can be entered through the data entry screen.

The advantage of this dataset is that executives are authorized to have access to this dataset can, with just a few keystrokes, query the file to locate possible candidates to fill a key position in the organization. Although the human qualities cannot be put into a computer file, it does provide a launching point for developing a potential candidate list. Further, as the executive peruses the file, they get a feel for all the key or "fast track" employees.

The first screen (Figure 6) of the Executive Development Tracking System is the main menu which utilizes a clist to begin the search. The first selection allows a browse session in the executive dataset.

EXECUTIVE DEVELOPMENT ANALYSIS MAIN MENU

A. View Executive Development List
B. Create a Subset of ED List
C. View Subset
D. Print Standard Report from Subset
E. Create Organization Chart
F. TSO Command Entry
G. SAS Command Entry
H. SPF (If not already in SPF)
Z. Exit Program

Enter your Choice ==>

Figure 6

The second menu option allows the user to create a subset of the primary executive dataset which takes the user to the screen seen in Figure 7 to establish the parameters for the subset which are included in a short SAS program that results in another screen formatted dataset for browsing (Menu Option #3).

Figures 8, 9, 10, and 11 demonstrate what an executive would be looking at after making choices on what type of potential executive was needed.

Option 4 allows the user to print a previously designed report from the data in the subset. The user will already be familiar with the format of the report. When this option is selected, the user is taken to another menu (not shown) that allows the user to determine the location that the output will be sent to.

EXECUTIVE DEVELOPMENT ANALYSIS MAIN MENU

A. View Executive Development List
B. Create a Subset of ED List
C. View Subset
D. Print Standard Report from Subset
E. Create Organization Chart
F. TSO Command Entry
G. SAS Command Entry
H. SPF (If not already in SPF)

Option 5 is a choice that is still in work.
Option 6 takes the users to a TSO command screen. Option 7 takes the user into SAS to create their own SAS command statements. Finally, the last option takes the user to SPF if they are not already in SPF.
Many developments are in the works for how this executive search dataset can be a more useful tool for the end user. The important point here is that SAS can be easily used to develop a true management decision tool that is not complicated and is effective.

A word of caution. There is always the danger of computerizing everything whether it needs to be or not. Sometimes when one is good with a hammer, everything then becomes nails. When starting a system or developing an application with a good tool, such as SAS, the tendency is to try to put every possible application on the computer. Though SAS can be an answer to some of the problems faced as human resource professionals, vigilance needs to be taken against going overboard and computerizing everything.

Summary

Hopefully this paper has given some answers/solutions to you who realize the value of the computer to the human resource professionals. The author recognizes that numerous uses of SAS are available that can be and should be used -- suggestions are always appreciated. On the other hand, this paper does not try to reflect the entire activity that is being pursued by our human resource department, but rather provides insight into our activities and provides a catalyst for those who are starting to wonder how to make their own HR department more in line with both the current available software and the needs of their organization. The author would be happy to respond to any queries or concerns regarding "Where do I go next?"

For additional information, please contact:
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General Dynamics
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Dataset Organization

Interactive Techniques
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FIGURE #1

Interactive Techniques
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FIGURE #2
COMPANY HUMAN RESOURCE INFORMATION SYSTEM

&SYSDATE.
&SYSTIME.

PLEASE WAIT UNTIL YOU GET THREE STARS, THEN PRESS ENTER
TO END THE SESSION, PRESS PF2 OR PF14

WE HOPE YOU ENJOY YOUR BROWSE!

ALLOC DA ('$FCB000.PAYSAS.DATA') F(PAY) SHR
ALLOC DA ('$FCB000.SAS.FORMATS') F(SASLIB) SHR
SAS
DATA
PROC FSBROWSE DATA-PAY.STORE SCREEN-PAY.PERSON OPTION-1;
RUN;
ENDSAS;
ENDDATE
END

FIGURE #3

Interactive Techniques
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COMMAND ===> Browse SAS data set: HISTORY.STORE | Screen 1

CURRENT STATUS

Data Current As of: 02/01/85
Database Updated: 01/24/85

IDENTITY
E Num: Soc/Sec:
Inita: Sen Date: 10/31/80
LName: Vac Date: 10/31

RATE DATA
Rate: 12.15
Min: 6.84
90%: 11.62
Max: 12.91
Cola: 0.05
APR Rev: C601
Lab Grd: 5

JOB DATA
Classification: Inspector-Shipping A
Occode: 4403 Shift: 1
Dept/Sec: 274-7 F/T&O:

PERSONAL
P/R Status: Current
Hire Date: 10/31/80
Term Date: Hire Status: N/Hire
Birthdate: 01/30/85
Yrs Seniority: 4.30
Age: 34.05
Race: 1
Sex: M
Phycode:
Address:
Phone Num:

FIGURE #4a

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**Interactive Techniques**

**SUGI '85**

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**FIGURE #4b**

**Command ====>**

Browse SAS Data Set: HISTORY. STORE

---

**WORK HISTORY**

---

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<thead>
<tr>
<th>REC</th>
<th>EFF DATE</th>
<th>OCD</th>
<th>LG</th>
<th>TITLE</th>
<th>RATE</th>
<th>COLA</th>
<th>APR</th>
<th>DEPT</th>
</tr>
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<td>4403</td>
<td>5</td>
<td>Inspector-Shipping A</td>
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<td>0.56</td>
<td>C601</td>
<td>274-7</td>
</tr>
</tbody>
</table>

**FIGURE #5**

**Command ====>**

Edit SAS data set: COLLEGE STORE

---

**TUITION REFUND**

**DATA ENTRY SCREEN**

---

**Employee:** Scott, CR 805550

**Semester:** Fall 84

**Degree Plan?** Y

**Course:** Basic Computer Programming

**School:** Tarrant County Commun College

**Date Approved:** 12/21/84

**Grade:** A

**Cost:** $45.00

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**Interactive Techniques**

**SUGI '85**

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COMMAND ===> EDIT SAS DATA SET: WORK.FILTER

====== FILTER SCREEN FOR SUBSET ======

PERFORMANCE  ___  (Enter 1, 2, 3, or 4)
POTENTIAL  ___  (Enter, H, P, or K)

SALARY GRADE
SERVICE YEARS
AGE

DEGREE  ___  (Enter Minimum Degree Requirement)

DISCIPLINE  1.  __  2.  ___  3.  ___  (Enter Degree Preference in Order)

Default Value for Above Variables Is All
Press PF1 to Exit

FIGURE #7

COMMAND ==> Edit SAS data set: EXEC.STORE

GRANT , Robert RT 403205 441-60-9493

PERSONAL

Age: 27
Payroll Code: 3
Birthdate: 09/11/57
Status: 1
Shift: 1
Eng Code: Race: 0
Sex: M
Vet: 0

DEPARTMENT & OCCUPATION

Department: 3
03-9
Occupation Code: 7403
Mail Zone: 1876
Title: Indust Relations Repr
Extension: 72660
Date of Last Change: 07/30/84
Time In Current Position: 0.5
Group: 018-02

PERFORMANCE HISTORY

Performance Potential
1982
1983
1984
1985

Backup Code: —
Development
Action Indicated: —
Action Code: —

FIGURE #8

Interactive Techniques
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**EDIT SAS DATA SET: EXEC. STORE**

**HISTORY AND EDUCATION**

**LAST PREVIOUS POSITION:**

<table>
<thead>
<tr>
<th>Department</th>
<th>Date of Change</th>
<th>Salary Grade</th>
<th>Time in Position</th>
<th>Penetration</th>
</tr>
</thead>
</table>

**BACHELORS:**

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<tr>
<th>Degree</th>
<th>Field</th>
<th>Year Completed</th>
<th>School</th>
</tr>
</thead>
</table>

**MASTER:**

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<tr>
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<th>Field</th>
<th>Year Completed</th>
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</table>

**DOCTORATE:**

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<th>School</th>
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</table>

**READINESS AND REPLACEMENT**

**READINESS:**

<table>
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<tr>
<th>Position 1</th>
<th>When</th>
<th>Position 2</th>
<th>When</th>
<th>Position 3</th>
<th>When</th>
<th>Next Job Objective</th>
<th>When</th>
<th>Ultimate Objective</th>
<th>When</th>
</tr>
</thead>
</table>

**REPLACEMENTS:**

1. **Surname** | Initial | Employee # | Sex | Race | Perf | Pot | Age | 1984 Title | Current Title |
2. **Surname** | Initial | Employee # | Sex | Race | Perf | Pot | Age | 1984 Title | Current Title |
3. **Surname** | Initial | Employee # | Sex | Race | Perf | Pot | Age | 1984 Title | Current Title |

**FIGURE #9**

Interactive Techniques
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**FIGURE #10**

Interactive Techniques
SUGI '85
<table>
<thead>
<tr>
<th>CURRENT JOB DUTIES:</th>
<th></th>
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<tbody>
<tr>
<td>PREVIOUS JOB DUTIES:</td>
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<td>TRAINING COMPLETED:</td>
<td>PROGRAM OR SEMINARY TIME YEAR CONDUCTING ORGAN</td>
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