

Paper 290-2012

Converting Complex Microsoft Access Database Reporting Systems Using SAS® Enterprise Guide®

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ABSTRACT

The need to store more and more data related to aggregate enrollment information for use in the Registrar's Office at the University of Central Florida led to the development of several Access databases several years ago to assist in capturing this data. The Access databases were expanded and adapted to perform additional functions beyond their intended scope. Due to the amount of data stored and the delivery methods originally implemented they were no longer able to meet the organization's reporting needs effectively and a new solution would be required. The Registrar's Office with technical support and assistance from Enterprise Decision Support (EDS) was able to develop a new and more robust data collection and delivery system. This paper will explore the transition from existing silo data stores to the SAS Business Intelligence environment and how it was accomplished using SAS Enterprise Guide (EG) and Stored Processes on the University of Central Florida SAS Information Portal.

WHO WE ARE

MISSION

The mission of Enterprise Decision Support (EDS) is to provide data integration services and actionable information solutions through the delivery of business intelligence applications and other knowledge management tools to support executive and operational decision-making and planning.

PURPOSE

The departments of Enterprise Decision Support and Institutional Research (IR) comprise the Institutional Knowledge Management (IKM) Unit. EDS partners with and supports IR to provide data for state, federal and all other official university reporting including ad-hoc requests for information. Through our Information Portal, Operational Data store, and dynamic web-based applications, the EDS development team delivers information and reports in various forms tailored to user need and technical aptitude. EDS is responsible for system support, administration, and security of the university data warehouse, which houses, but is not limited to, official state report data and functional reporting data marts. The ability of EDS to provide actionable information solutions is enhanced by the ability to integrate data from across the enterprise, utilizing Business Intelligence (BI) analytical tools, and through empowering users by training and education on how to use and understand the solutions provided.

BACKGROUND

Enterprise Decision Support has, as one of its primary objectives, the task of maintaining and promoting the university data warehouse. This enterprise-wide data system facilitates the creation, access, and dissemination of institutional knowledge pertinent to the university. The data warehouse contains over fifteen years of student reporting data, including official state reporting data, past and current term enrollment and student credit hour data tables, OLAP cubes and degree to date data. This warehouse of information serves as the foundation for the development of a wide variety of reporting applications using SAS® Business Intelligence software.

INTRODUCTION

The University of Central Florida Registrar's Office required a growing amount of information over time to give them accurate pictures of student body enrollment information and the impact of related academic processes. An in-house solution to aggregate this information in a quickly readable format was developed.

The initial iteration developed several years ago was focused around a series of Access Database applications with some complex programming to extrapolate the required data from the copious amounts of daily enrollment information generated. One of the primary requirements of this application was to record enrollment information on a daily basis leading up to the end of an enrollment period for a term and compare this data with a time equivalent period the year prior. The intent of the previously developed reports was to help analyze and extrapolate growth indicators for student groups and academic departments at UCF and to aid in future academic enrollment decisions by the Registrar's Office executive officers.

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The new solution implemented by the Registrar's Office required a more robust database system to house the growing data requirements and move the existing processes to their next evolution of development. A decision was made to convert eight existing Access databases and their execution logic to the SAS BI environment. To facilitate this transition the use of SAS Enterprise Guide was necessary and development of the necessary projects, code and stored processes would be required.

ORIGINAL APPLICATION OVERVIEW

The original application consisted of a series of 8 linked Access databases that were run sequentially during an enrollment period. The databases would collect daily enrollment data and aggregate the data into reports delivered via email integration. The source of data is an Oracle/PeopleSoft enterprise system. This data is collected daily at the same time and ready for distribution prior to start of business.

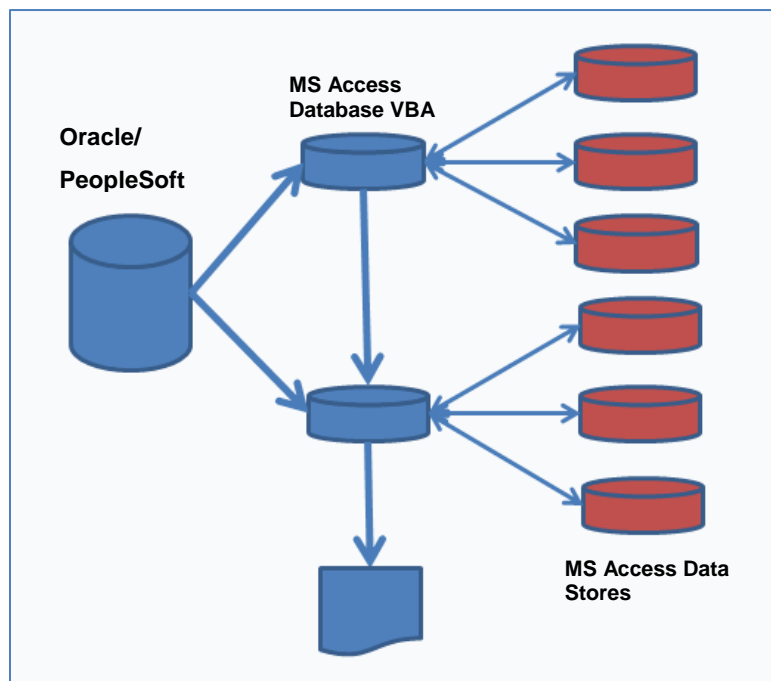


Image 1. Original Access Database Schema Relations.

CHALLENGES

One of the largest obstacles to converting the existing system to SAS was identifying elements within the application that could be implemented in the new environment and what could be redeveloped to take advantage of SAS's enterprise systems. The existing application was an amalgamation of over a decade worth of programmer development, patch coding and modifications. Sorting through the entire process and parsing out each element into manageable elements for conversion required an enormous amount of hours.

The main concern in this system was storing the historical information gathered by these systems. The existing database collection was generating almost 10 gigabytes of information per academic year in enrollment aggregated information. Limitations on database size limits when working with MS access were a major concern during this process and propagated the multi data store solution in the databases final iteration prior to conversion to SAS. All of this data was stored in siloes of Access database repositories and inaccessible for further use and analysis by anyone other than the Registrar's Office. Each of the MS Access Data Stores (Image 1) housed historical information for a specific term by either Credit hour or Unique Headcount. A solution would be required to bring all these disparate storing elements together in a single environment with contiguous data storage ability.

Another challenge to overcome was method of distribution. The existing system had an integrated Novell GroupWise API that allowed reports generated to be distributed through on campus solutions. Re implementing the delivery method would be adding a considerable amount of development time as new reporting development would be required to harness SAS enterprise portal solutions. This one facet was a one of the major conversion points in this process and one that would be realized by using SAS portal delivery tools and methodologies.

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CONVERSION PROCESS

DEVELOPMENT

Element Identification

During the initial development process each primary element of the of the existing database system had to be identified and evaluated for conversion. These were:

1. Historical data consolidation and storage
2. SQL conversion from Visual Basic for Applications (VBA) to SAS code
3. Consolidation of multiple Databases to single program for Stored Process execution
4. New methods for delivery options. (portal solution)
5. Maintenance overhead.

Historical Data Consolidation

The one of the concerns with the conversion process was brining all of the silos of data stores together in a singular location for use in further analysis and reporting needs. The way the data was collected and stored had to be reanalyzed and a new table structure was implemented with additional variables to aid in condensing the data from term to term while maintaining the existing structures original set of variables. When this process was completed over 7 million observations of data had been collected spanning over 9 original access databases into a single record set in SAS. Using EG we began to develop new dataset schemas to accommodate the compiled data and additional variables to help identify the compiled information between terms. The powerful import and Data Integration features of EG allowed development to quickly load the new datasets from a wide range of sources in a short amount of time with minimal conversion and data clean up issues.

VBA to SAS CODE using EG

The conversion process allowed development to consolidate the existing VBA code into a single SAS program for use in a Stored Process. A key feature of this conversion was the ability to incorporate ProcSQL elements and Data steps seamlessly throughout the program. The strength of the SAS code language was evident during one portion as over 500 lines of VBA code were removed and recoded due to more concise coding and algorithm implementations.

Another element that facilitated the conversion was the visual richness of SAS Enterprise Guides process flow to completely understand the sequence of execution in the application as development progressed. This feature of EG allowed complex concepts in the original application to be replicated with great ease as clear data paths of execution and transformations could be clearly conceptualized and then implemented during development.

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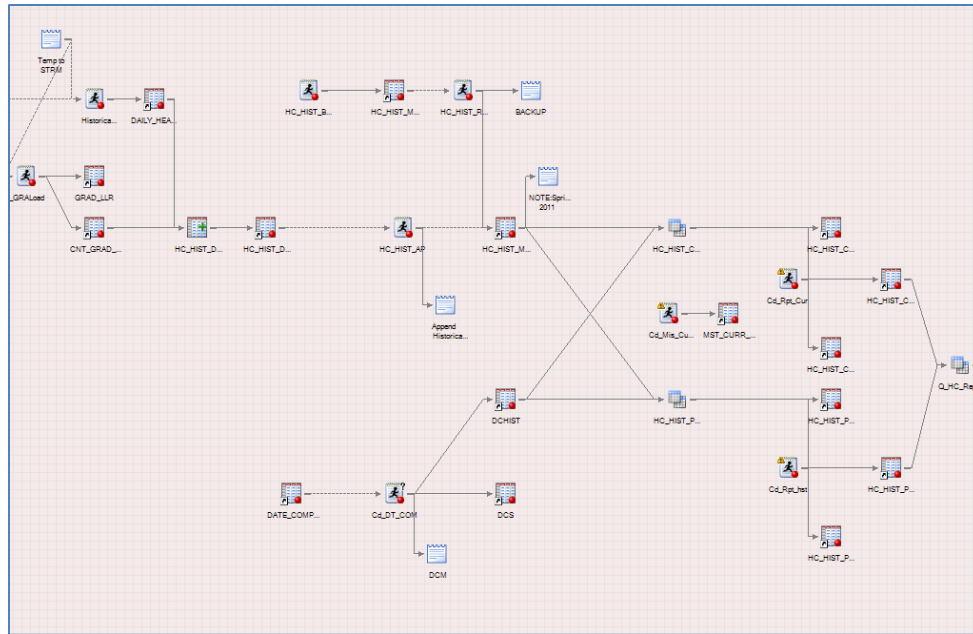


Image 2. Visualization: EG Process Flow helps keep development organized.

Report Delivery using Stored Processes

Once the conversion of the SQL and logic elements was completed, all of the code used to execute the process was exported and converted into a single SAS program. This was then used to develop several stored processes that would be used to deliver the generated data to the UCF portal.

The original process generated a series of 4 reports that were programmatically generated as a PDF. The file was then stored in a network location and then during the delivery portion retrieved and sent via Novel solution via email. This process was extremely cumbersome with regards to programming maintenance and on network and system resources. IT was also heavily dependent on many external systems function at the same time to ensure the files were accessible and then delivered in a timely manner.

During the redevelopment it was decided to store the report data in a manner that would allow on demand generation of the report based of the data builds for that day. This would also allow for historical reports to be accessed on demand. A series of SAS programs containing comprehensive Proc Report steps were developed and using ODS were implemented into the UCF Pegasus mine portal. EG allowed for comprehensive testing and development of the reports appearances and facilitated in creating the code required for implementation in a stored processes.

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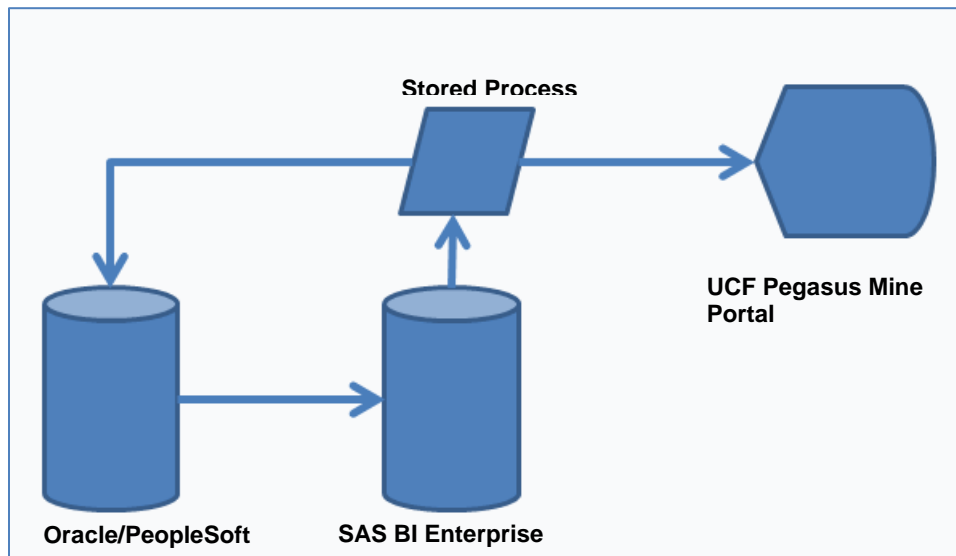


Image 3. New application schema for data collection and delivery.

Maintenance Overhead reduction

During the entire development process one key factor that was observed in each stage of the process was the amount of maintenance required for the new system. Recoding and reimplementing of features in the original system that were deemed unusable or cumbersome were modified and implemented in new low maintenance processes. With EG we were able to develop maintenance business processes that allowed annual maintenance of historical data and any administrative or academic changes in the institution to be reduced from several weeks to less than two days. This had a dramatic impact on man-hours needed during that time period, no longer requiring overtime work to be done to get the entire data cleanup in prior to the next academic year.

CONCLUSION

Throughout the development of the application and conversion from MS Access to SAS, Enterprise Guide was an integral part of this process. The power of Enterprise Guide became evident as each identified area of conversion was able to be accomplished using the EG toolset. The ability to use a single product to do Development, ETL tasks and output and delivery tasks was invaluable to our team. The rich features and adaptability allowed the developers to quickly accomplish this project in a fraction of the time.

ACKNOWLEDGMENTS

The author is grateful for the fantastic resources found at the support.sas.com website. The author would like to acknowledge all the individuals involved in this development effort from Enterprise Decision Support at UCF.

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