

Building Yield Management - GUI System at Norwegian Cruise Line®

By Using

SAS/EIS® and SAS/AF®

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Introduction

Creating a Graphical User Interface (GUI) is clearly very different from writing regular SAS program code. However, an experienced SAS programmer already has over half of the required skills to develop such system. Once you understand the basic concepts of Screen Control Language (SCL), you will find that building a GUI is not such a difficult task.

The tutorial will take you step by step on how to design and build your GUI application using both SAS/AF® and SAS/EIS® from the very beginning. It will also show you how to customize your GUI applications and embed regular SAS program code into your GUI. The author also will share his experiences in designing and developing the GUI as a part of the Yield Management system at Norwegian Cruise Line. The main focus of this paper is to outline the GUI system at Norwegian Cruise Line. More will be discussed during the tutorial session.

Yield Management System at Norwegian Cruise Line®

As one of the four major cruise lines in the world, Norwegian Cruise Line® (NCL) operates a 10 ship-fleet. Its ships sail to popular and exotic destinations throughout the world including Alaska, Bermuda, Canada/New England, the Caribbean, Europe, Hawaii, Mexico and

South America. NCL has grown dramatically over the past two years with an explosive 70 percent growth in capacity. With its recently announced plans for a billion dollar build program to add new ships to its current fleet, NCL is the fastest growing cruise line in the industry.

With the fully support from its board members, the senior management at NCL committed to build an advanced Yield Management System that can quickly reflect both external and internal business changes. This system will allow NCL to better predict the demand of its products, and translate into higher yield, which, along with load factor, are the two major key measurements of profitability for the cruise industry.

What makes it difficult to develop a yield management system for a cruise line is the complexity of its business nature. In particular, high priced, perishable inventory, and lack of direct interaction with the customers (most bookings are done through travel agents). Those factors, in the turn, require both cruise lines and potential passengers to plan a long time ahead. At Norwegian Cruise Line, a typical itinerary and pricing planning starts two years to 18 months prior to sailing date. During this period, many types of prices and promotions will be deployed depending on the forecasted bookings and changes in the marketplace. Without a reliable Yield Management System, it's very difficult, if not impossible, to implement such complicated marketing and sales

strategies to determine when, where, what, and whom to sell in order to maximize revenue

At NCL, due to the enormous transaction records and historical data, SAS is used as the main tool in developing the Yield Management System. After developing all the necessary business models, the next question is how to present the results to the users? Traditionally a large amount of paper reports were produced, copied and distributed throughout the company. Due to advanced yield management system, there's tremendous increase in the volume of such reports, which makes it even more difficult for the users to identify the key changes in the booking trend. In other words, there is an urgent need to develop an on-line reporting/OLAP system, in order to make the yield management system more efficient and effective.

Since SAS is the main data processing/analyzing tool at NCL, it's an easy decision to choose SAS/AF[®] and SAS /EIS[®] to develop such an on-line reporting system – the Graphical User Interface system (GUI), considering the following factors:

- Efficiency – all the components are SAS based;
- Utilizing the power of all SAS packages such as SAS/GRAPH[®], SAS/MDDDB[®] and data mining and warehousing. Figure 3 shows the SAS/GRAPH[®] output generated by user's selection from the previous screen (Figure 2);
- With SAS WEB/AF, it greatly increase the accessibility without licensing SAS to the PCs;

Even SAS/AF[®] and SAS/EIS[®] are part of the SAS packages, however, with the customized *pmenu*, modified *autoexec* and *config*, it does not require users to have any formal training in SAS. In other words, to the users, it's just like a regular window-based application. Figure 1 is the main screen where the user invokes the GUI application.

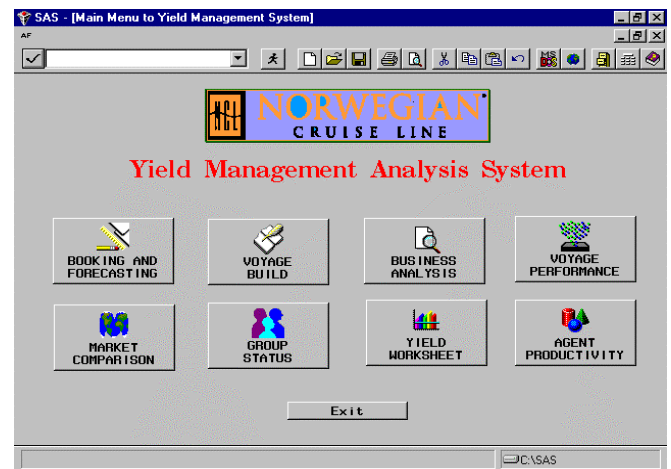


Figure1: GUI main screen

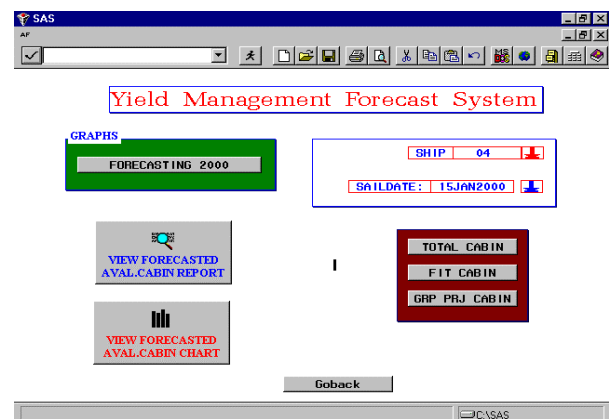


Figure2: secondary screen

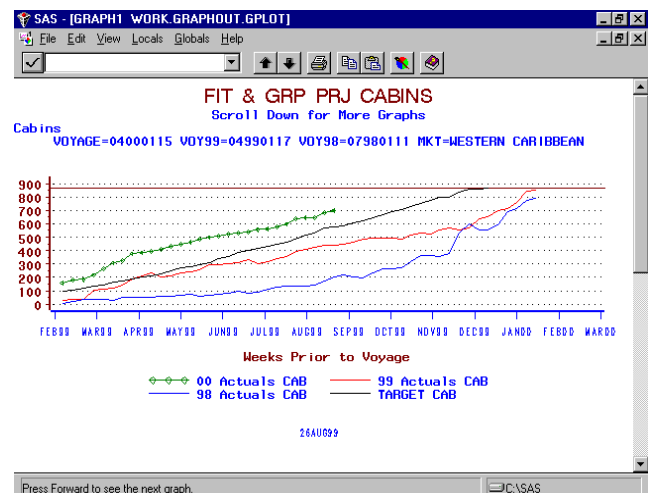


Figure3: SAS/GRAPH[®] output screen

The GUI system at Norwegian Cruise Line

Norwegian Cruise Line uses an MVS/390 CMOS 2003 Process Model 123 mainframe as the reservation server; a UNIX IBM RS6000 AIX J30; an Oracle® 7.2.2.3 as the primary database; and desktops with Windows95® clients connected via TCP/IP. Data is extracted daily from the reservation system and feed the Oracle® database.

There are about 600 active voyages at any one time, and 1,200 historical voyages in the Oracle® database. Norwegian Cruise Line recognizes that effective management of complex; dynamic data is the key to being competitive in the cruise line industry.

It's essential to provide the management staff a fast and efficient tool to quickly identify the critical changes in the booking trend, in order to make sound revenue decisions. That is the primary reason why the GUI was developed as the major part of the yield management system. With the GUI, a user not only is able to quickly browse through a large amount of information and create his/her own reports, but also has the ability to slice n' dice the data in his/her own way.

The GUI system at NCL was developed by using PC SAS/AF® and SAS/EIS®. However, the data sources are generated and stored in the IBM AIX (UNIX) server. When the user invokes the GUI icon, it automatically connects to the server by executing the following codes, which are a part of the modified *autoexec*:

```
%LET MYREMOTE=SERVER ADDRESS;  
OPTIONS REMOTE=MYREMOTE  
COMAMID=TCP;  
FILENAME RLINK  
'C:\SAS\CONNECT\SASLINK\TCPUNIX.SCR';  
LIBNAME IA 'C:\SAS\SASUSER';
```

```
GOPTIONS DEVICE=WIN;
```

```
OPTIONS      FMTSEARCH=(IA)      NOFMTERR  
MULTENVAPPL MAUTOSOURCE;
```

The benefits of using both PC and UNIX server in this GUI system are as follow:

- High security and customized accessibility – such as browsing vs. updating ;
- Fast processing – with the established connection, the user is able to send queries to the server and bring back results through the **submit continue and endsubmit** procedures embedded in the SCL codes;
- Most of the data at NCL is generated through the automated UNIX SAS programs. Once the programs are finalized, the formats and the locations of the outputs rarely change, thus making it easy to maintain;
- PC SAS, as the front end, makes this system very user-friendly;

The following codes, which are embedded in the SCL codes, setup the library on the server:

```
submit continue;  
  libname lib1 'server directory' server=myremote;  
endsubmit;
```

Conclusion

SAS is a highly effective tool in helping Norwegian Cruise Line manage its complex and dynamic data. The GUI is proven to be a very powerful user interactive system to support the revenue decision-making at NCL.

Like other software development, when developing the GUI system, the programming standards ensure the high quality of the system. These standards should be consistent from the beginning of design to coding, to testing, to walking through with users, to ensure a successful roll out.

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