Abstract

The White Scan system takes the findings of laboratory tests (e.g. for whitening agents) and presents the results in the form of three-dimensional SAS graphs. These compare the products with competitive products and are used by the sales force as computer-assisted promotion. The application was developed by Ciba SAS Support at the request of end users, who wanted to achieve a considerable simplification of the previous complicated multi-stage process. The SAS/AF application runs online on an IBM host under MVS and SAS 6.07. The use of SAS/SHARE enables several users to use the application simultaneously. The graphic output to the plotter is produced by a batch job over the Internal Reader. The submission of the batch job to produce the graphics on the plotter can be initiated online by a single keypress or mouse click.

White Scan: Whiter Than White - in 3D

Some of you may have already heard of the Ciba company. Perhaps you have recently stopped smoking with the help of our new plaster, or you drive a red car whose pigment comes from our company. Or maybe one of our wide range of medicines has helped you, or use our contact lenses. In short: Ciba is a multinational company, which manufactures and sells not only pharmaceutical products but plastics, additives, plant protection preparations and other products.

Around 22,000 staff work in the Swiss branches of our company; around 1200 of these are registered SAS software users, looked after by a central SAS Support service with three staff. We have been using SAS for a huge variety of projects for over 17 years:

- Statistical quality control (ALADIN) in Additives
- Graphical reporting of complaints in Additives
- Pricing system in Plastics, Pigments and Additives
- The INFORMATRICS clinical trial reporting system in Pharma
- The quality assurance system QSIS in Switzerland
- Phase lists and reports in herbicide research in Plant Protection
- Conference planning in Plant Protection
- Performance evaluation of the IBM Host
- Material management system statistics
- Computer Aided production Planning
- Education and user registration system in SAS Support
- Various combinations of SAS with FOCUS and INQUIRE applications
The White Scan application was developed by our SAS Support unit for the Chemicals division, in order to make the previous complex multi-stage working process much simpler and more stable. The Application White Scan processes results from test sequences, e.g. for optical whiteners, in such a way that whiteners with the help of 3-dimensional SAS graphs can be usefully deployed. The graphs are used to compare our products with those of the competition and are used in sales consultancy as computer assisted promotion.

When the project was initiated, our customers in Chemicals described the complicated process for obtaining marketing graphics. The results of the measurements were first input to the STATGRAPHICS ® PC program, to generate the parameters for the regression equation. With these six parameters, a first FORTRAN program on the host calculated around 150 triples of values. A further FORTRAN program increased the number of curve points to around 600 observations, on the basis of which a SAS program finally printed the graph onto paper or foils.
The users wanted this process substantially simplified, and we decided to convert it to an all-SAS application. The application runs online on the IBM host under SAS 6.07 and is so constructed that the entry of measurement data automatically triggers all further steps to production of the graph. However, the main menu also allows direct selection of individual subtasks for the application. If the plot points are already stored, for instance, a graph can be produced directly. Submission of batch jobs to produce the graph on the plotter is done by key-press or mouse-click directly from the online application. Two further options allow the construction and maintenance of the Annotate data sets and the maintenance of graph catalogues.

White Scan: The new process

I won't go into detail here about the theoretical background of test planning with the so-called pentagon model. The work with the application White Scan only starts when eight to ten value triples from the laboratory measurement are available. The first point of the main menu is 'enter measurement'. We dealt with this part somewhat routinely, mainly with the FSVIEW procedure. To calculate the plot points from the measurements, first we need to calculate the coefficients of the equation with the help of the pentagon model. We use the procedure RSREG in SAS/STAT ® for this. The only problem with this procedure is that although it can produce an output data set, this leaves out precisely the coefficients which we need. We therefore have to use the procedure PRINTTO to write the multi-page output of RSREG onto a temporary file and read this using a Data Step, before we can start on the real calculation.
The White Scan Application: Some SAS/AF Panels

**START**

The White Scan System

**Main Menu**

- Measurements: enter
- Plot Points: calculate
- Graph: create
- Annotate Data Set: annotate

**XYPANEL**

Parameters for the Regression Equation

- **X Axis**
  - Minimum: 0
  - Maximum: 300
  - Increment: 20

- **Y Axis**
  - Minimum: 10
  - Maximum: 30
  - Increment: 1

Number of calculated triples: 336

**COMPOS**

The White Scan System

Graphics Parameters

- Data Set with Plot Points: WTSC.P.UNO
- Annotate Data Set: WTSC.A.UNO
- Graphics Catalog: WORK.GSEG

- **Xmin:** 100  **Xmax:** 170  **Xticknum:** 6  **Format:** 3.1
- **Ymin:** 100  **Ymax:** 170  **Yticknum:** 7  **Format:** 4.2
- **Zmin:** 100  **Zmax:** 170  **Zticknum:** 8  **Format:** 3.0
- **Rotate:** 65  **Tilt:** 55
- **Color Levels upper:** 140  **lower:** 120

**NEXTACT**

The White Scan System

Please select the next action:

- Send Graph to Plotter
- VTAM Address: BPC00803
- Change Graphics Parameters and view Graph
- Back to Main Menu
- Leave the application

Main Menu of the application

Panel to enter the X- and Y-axis increments

Panel to define the parameters of the graph

Selection of the next action
The number of points to be calculated is set by the user, by entering the X- and Y-axis increments in an AF panel. The multiple linear regression equation, which we need to generate the values for the graph, is resolved in a Data Step which executes two nested loops:

```sas
data &dsn(keep=xachse yachse zachse);
  set trans;
  do xachse = &xmin to &xmax by &xincr;
    xach2 = xachse*xachse;
    do yachse = &ymin to &ymax by &yincr;
      yach2 = yachse*yachse;
      xyach = xachse*yachse;
      zachse = col1 + (col3*yachse) + (col2*xachse) + (col6*yach2) + (col4*xach2) + (col5*xyach);
      output;
    end;
  end;
run;
```

The calculation of the 400-600 points goes very rapidly on the host. The user now enters an AF panel allowing the construction of the graph. The user can first choose which Annotate data set he wants to use for the text of the graph. He can also influence the scaling of the axis and the format of the legend. As you know, G3D graphs are most effective when slightly tilted and turned, and the user can adjust this parameter too. And the impact of the graph can be further enhanced by setting the color limit of the Z value. The graph is only generated and displayed when all parameters have been set (this can be done in advance with an initialisation file) according to the user's preferences.

After leaving the graph screen, the user can select the next action. If the graph does not yet exactly correspond to his wishes, the user can return to the previous panel and change the parameters. Only when he is entirely satisfied the graph is produced, by a key-press or mouse-click.

We did need a few programming tricks to achieve all this.
In order to minimize resource usage, plotter graphs on the host are only available via batch jobs. The problem was therefore to start a batch job (to produce the graph shown on the screen) from the online application. Fortunately, MVS hosts have a useful feature called the Internal Reader. One can write a batch program from an online application into the Internal Reader, which will immediately process it. The JCL for this can be stored in, for instance, a SAS data set:

```
//WRAJ#WS JOB (X,66267,ILT040),'051 RAUBER',CLASS=S
// EXEC SAS
//GSASFILE DD SYSOUT=A,DEST=XXXX
//SYSIN DD *
%hp7550a;
LIBNAME WTSC 'B.A5006.SAS.WTSCAN' SERVER=SASSRV;
GOPTIONS HPOS=80 VPOS=32 BORDER NORotate;
proc g3d data=XXXX;
   SCATTER YACHSE*XACHSE=ZACHSE /GRID
      anno=XXX
      XTICKNUM=XXX YTICKNUM=XXX ZTICKNUM=XXX
      zmin=XXXX zmax=XXXX
      rotate=XXXX tilt=XXXX
      shape=shapevar size=1.5 color=colorvar;
      FORMAT XACHSE XXX YACHSE XXX ZACHSE XXX;
      LABEL XACHSE='00'X YACHSE='00'X ZACHSE='00'X;
run;
quit;
```

With the correct FILENAME statement and a Data Step, the thing can be done pretty simply, once one has set a couple of macro variables to ensure that all parameters are correctly transferred.

```
data batnew;
   set sasuser.pltbat;
   if _n_=3 then line="//GSASFILE DD SYSOUT=A,DEST=&pltadr";
   if _n_=8 then line="proc g3d data=&dsn;";
   if _n_=10 then line="anno=&anno";
   if _n_=11 then line="xticknum=&xt yticknum=&yt zticknum=&zt";
   if _n_=12 then line="zmin=&zmin zmax=&zmax";
   if _n_=13 then line="rotate=&rotate tilt=&tilt";
   if _n_=15 then line="format xachse &stx yachse &sty zachse &stz;";
run;
filename plot sysout=m pgm=INTRDR recfm=fb lrecl=72;
data _null_
   set batnew;
   file plot noprint notitle;
   put line $72.;
run;
```

And now the user can happily proceed to generate further graphs.
The work on White Scan's graphics is carried on by a team of several people in the Chemicals division. It therefore seemed sensible to put both the data and the application in a central library. However, in order that all team members can work with White Scan simultaneously, the library has to be allocated with the SAS/SHARE server: only this ensures simultaneous read/write access to the data.

```
LIBNAME WTSC 'B.A5006.SAS.WTSCAN' SERVER=SASSRV;
```

The graphs generated by White Scan actually consist of two parts: the graph itself and the legend superimposed with the Annotate Facility.

![Image](image.png)

Although a new Annotate data set is automatically created when measurements are entered right at the start of the application, the user may at any time want to change part of the legend. We therefore included a special part of the application dedicated to support of the Annotate data set.

The final graphs can be chosen to reside in either temporary or permanent catalogs. In this connection, the user wanted to be able to send graphs from a permanent catalog onto the plotter. The menu item Graph Catalog now gives him the option not only to update the graph catalogs (with Proc GREPLAY) but also to send one or more graphs to the plotter.

We were unable to fulfill one user request. When Ciba changed its logo last year, many SAS users naturally wanted to be able to include the new logo as soon as possible on their documents.
There was no great difficulty in creating and implementing the Ciba logo with the procedure GFONT in SAS/GRAPH ®. However, the print quality of the logo on plotters and printers failed to satisfy the exacting requirements of the Ciba logo team.

In the future, it is intended to take the stored White Scan graphs on a portable PC to customers, in order to provide consulting services under the heading of Computer Assisted Promotion (CAP). For test and demonstration purposes, we have transferred the application from host SAS to Windows-SAS. The Windows version of White Scan does, however, need revision and adjustment to the capabilities offered by the operating system.

Conclusion

Programmed as a SAS Application, a complicated multi-stage work process can be simplified and become more secure and user-friendly. The use of the Internal Reader (note: available on MVS hosts only) made it possible to start the batch job to plot the graph from the online application. A team of several users can concurrently access the application as well as the data due to the use of SAS/SHARE Software.

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