

Becoming “Web Enabled” with SAS/INTRNET® Software

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Abstract

This paper discusses how SAS/INTRNET software answered our challenges of presenting user-friendly educational reports for thousands of Texas public schools on the web. Target audiences should have a basic understanding of the web environment, networks, HTML and the SAS macro language. SAS products required for the implementation and development of applications using SAS/INTRNET software: SAS®, SAS/CONNECT®, SAS/INTRNET and SAS/SHARE®. The focus of this paper highlights our challenges when presenting massive amounts of educational data on the web in the form of highly formatted individual school reports. Primary concern was the ability to quickly and conveniently post data that would meet our requirements of “user-friendly” reports. Traditionally the public school reports have been produced using SAS and printed in a highly controlled format using the DATA _NULL_ statement. When presenting this educational data on the web, the desire was to emulate the format of the traditional printed reports. SAS/INTRNET software running in a UNIX/AIX environment allowed us to accomplish all of our objectives. Through the use of SAS/INTRNET, we were able to conveniently modify existing SAS programs to quickly produce interactive HTML files. Furthermore, SAS/INTRNET allowed retaining control of page layout on the web and made possible the presentation of “user friendly” reports.

AEIS data and “user-friendly” output

Our primary objective when presented the task of placing AEIS (Academic Excellence Indicator System) data on the web was the user-friendly presentation of multilevel educational data. AEIS reports have been produced annually since 1991 for each of the 1059 districts and 6875 public schools within the state of Texas (enrollment of 3.8 million students). These reports are generated using SAS software executing on the MVS platform. Traditionally AEIS reports have been produced in print form with the approximate length of 5 to 7 pages per report. And on account the AEIS data is disaggregated into several different student groups

(e.g. ethnicity), AEIS data is presented in tabular format for easy interpretation.

(See Figure 1 – AEIS print report)

Throughout the development of the AEIS report, great concern has been always given to the presentation of the educational data in a fashion that has allowed for easy interpretation. By having control of the AEIS data layout in print form, we have been able to maintain a user-friendly “experience” with AEIS data. The major concern of ours when presenting AEIS data on the web was that the data remain user-friendly for the client. We knew that getting the data on the web was not an issue, however displaying user-friendly structured reports within HTML was the real challenge.

Initial attempts to display AEIS data on the web

Initial attempts were carried out to display AEIS data on the web and some success was made. Although the data was made available for every district and school within the state, the data was presented in several single column reports for each district or school. This presentation of the data was less than user-friendly and considered “user-hostile” by many. Knowing that the data was of interest to many (e.g. parents and educators of 3.8 million students), our desire remained to improve the presentation of data when viewed on the web. As we had control of the AEIS data layout in print form, we desired to maintain control over the AEIS data on the web so that user-friendliness was assured.

Our foremost need was the ability to present AEIS data on the web that would meet our requirements of user-friendly data. This meant regaining control of data layout on the web for generated reports. In other words, for the web we wanted to emulate the printed presentation of AEIS data. The most unique and challenging requirement for our data demanded that individual AEIS reports be presented in a highly structured format. Layout of the printed AEIS reports was achieved by use of the DATA _NULL_ statement. The thought of producing programs that generate highly formatted documents within HTML

was particularly daunting given the size of our data set, number of reports and complexity of the program used to create the individual reports. Accomplishing this objective with conventional CGI scripting presented an enormous challenge to our small group of SAS programmers. Major work would be required to restructure a mirror database and write CGI scripting within HTML files. Thus another need developed for our group: clearly we needed the means to quickly develop interactive HTML files that would post custom reports to the web. This additional demand was extremely important on account of the hectic timeline of our fall reporting schedule. In summary, to accomplish our objectives, we needed software that would:

- allow for quick development of applications within HTML for the production of individual AEIS reports
- maintain control of page layout on the web when creating the AEIS reports.

Use and Requirements of SAS/INTRNET®

Naturally, when thinking about software for creating reports on the web, we desired to use SAS due to the fact that our programs were written in SAS and our data resided in SAS datasets. We didn't have the luxury of time to learn CGI scripting and rewrite our SAS programs, which were an average of 3000 lines in length. Fortunately for our group, SAS had completed the beta version of SAS/INTRNET software in the spring '97 and we were given a trial version to evaluate.

Our software requirements included 4 SAS products: SAS, SAS/CONNECT, SAS/SHARE, & SAS/INTRNET; all of which reside on a RS6000 Unix server. Presently we have 2 SAS sessions executing.

(See Figure 2 – diagram of networked server configuration)

The modifications made to our existing SAS programs included the incorporation of one of the three SAS INTRNET macros. Because of the use of DATA_NULL_, we utilized the OUT2HTML macro.

```
%OUT2HTML (CAPTURE=ON);
```

```
DATA_NULL_;
FILE PRINT PS=66 NOTITLE;
SET ALL_CAMP;
BY CAMPUS;
```

```
%TAASPRT (3)
```

```
%TAASPRT (3)
```

```
.
.
.
.
```

```
RUN;
```

```
%OUT2HTML (CAPTURE=OFF,
            HTMLFREF=_WEBOUT,
            OPENMODE=REPLACE,
            RUNMODE=S,
            SEPTYPE=NONE,
            ENCODE=N,
            BGTYPE=COLOR,
            BG=WHITE);
```

We also added new SAS macro code to enable the dynamic "searching" logic of the program. In addition, we created HTML files which included the code that executes the SAS program.

(See Figure 3 – HTML with reference to SAS CGI broker)

Cost & Benefits of SAS/INTRNET® Software

The cost of implementing SAS/INTRNET was not only the cost of the 4 software components, but also the time spent learning the non-SAS components of creating web applications, such as HTML, and the VI editor. The benefits clearly outweighed the costs. Had we been required to learn a CGI scripting language, we would not have been able to produce a complete web site incorporating 18 SAS programs. The average programming time spent per application was 1 hour. This quick turnaround allowed for our goals to be met. The availability of our reports on the web meant our clients were getting their needs met. We had a decreased demand in paper copies from the agency, which resulted in increased productivity for staff. An additional gain was achieved by distributing the processing load for the AEIS web queries to a separate server. In other words, web clients would not be competing with us for processing time on our mainframe hardware. Also, should demands from our clients warrant, SAS/INTRNET software features built in flexibility for meeting the needs of increased processing power (i.e. additional servers).

Assessment of SAS/INTRNET® Software

In general we are quite pleased with SAS/INTRNET software (1.0). Our work with the SAS/INTRNET software has brought our attention to at least one area remaining in need of improvement. With SAS/INTRNET version 1.0, the specific placement of HTML tags within preformatted HTML output can not be made when using the OUT2HTM Macro with the DATA _NULL_ statement. We have been told that the SAS Institute is working on this particular issue. Despite this shortcoming, by utilizing SAS/INTRNET software we have use of a tool that provides convenient development within the dynamic medium of the world wide web.

Future plans for presentation of AEIS data on the web include providing more interactivity. Hypertext links to supporting AEIS documentation and “drill-down” facilities within the online AEIS reports are some definite considerations. Providing access to archived AEIS data and providing convenient trend analysis for individual districts and schools are also possibilities. Also, the implementation SAS/GRAPH® to provide graphic display of data (e.g. histograms) provides a very attractive feature for the presentation of the AEIS data.

In summary, with a state student population of over 3.7 million students and the staff to support the education of these students, the relevance of AEIS data to so many undoubtedly warrants the investment in SAS/INTRNET software. We are now postured better than ever to answer the needs of our diverse set of clients (e.g. parents, educators and researchers). No longer are we confined to the print medium of 8”x11” inches. Color, graphs and moreover interactivity are now all possible when presenting data to an audience of millions. SAS/INTRNET software makes developing applications in this new frontier all the easier with a language that has remained very familiar to us all.

Acknowledgment

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TEXAS EDUCATION AGENCY
 Academic Excellence Indicator System
 1996-97 District Performance
 Accreditation Status: Recognized

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Indicator:	State	Region IV	District	African American	Hispanic	White	Native American	Asian/Pac.Is.	Male	Female	Econ. Disadv.	Special Educ.
Attendance Rate												
1995/96	95.1%	94.9%	95.4%	95.8%	95.3%	95.5%	91.5%	97.4%	95.6%	95.3%	94.7%	94.7%
1994/95	95.1%	94.9%	95.5%	95.7%	95.1%	95.6%	93.1%	97.9%	95.6%	95.4%	94.9%	94.4%
Dropout Rate												
1995/96	1.8%	2.2%	0.9%	1.1%	1.1%	0.8%	0.0%	0.0%	0.9%	0.9%	0.8%	1.6%
1994/95	1.8%	2.1%	0.8%	0.9%	1.3%	0.6%	0.0%	0.0%	0.7%	0.8%	1.4%	0.9%
% Adv. Courses												
1995/96	17.3%	16.8%	12.3%	6.3%	12.3%	13.2%	*	35.0%	9.5%	15.0%	6.0%	0.9%
1994/95	15.1%	14.3%	9.4%	3.8%	5.4%	11.9%	*	20.8%	9.3%	9.5%	2.6%	0.0%
% Rec. HS Pgm.												
Class of 1996	0.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Class of 1995	0.3%	0.2%	0.0%	0.0%	0.0%	0.0%	-	0.0%	0.0%	0.0%	0.0%	0.0%
AP Results												
% Taking												
1996-97	8.5%	9.2%	2.1%	0.0%	0.7%	2.8%	*	14.3%	2.7%	1.5%	n/a	n/a
1995-96	7.6%	8.4%	1.0%	0.0%	1.5%	1.0%	*	7.5%	2.0%	0.5%	n/a	n/a
% Scores >= 3												
1996-97	58.7%	68.9%	61.1%	-	*	56.3%	-	*	80.0%	37.5%	n/a	n/a
1995-96	60.6%	70.2%	50.0%	-	*	37.6%	-	*	45.4%	*	n/a	n/a
% Examinees >= 3												
1996-97	61.7%	71.2%	78.6%	-	*	75.0%	-	*	88.9%	60.0%	n/a	n/a
1995-96	62.6%	72.9%	85.8%	-	*	*	-	*	83.4%	*	n/a	n/a
TAAS/TASP Equiv.												
Class of 1996	40.0%	42.0%	43.0%	15.8%	42.6%	49.7%	*	44.4%	47.0%	39.6%	25.6%	*
Class of 1995	39.9%	41.6%	39.8%	18.7%	22.7%	47.4%	-	*	43.5%	36.1%	12.0%	-
SAT/ACT Results												
% At/Above Crit.												
Class of 1996	26.3%	30.8%	26.6%	5.6%	20.7%	33.7%	*	16.7%	34.5%	21.2%	n/a	n/a
% Tested												
Class of 1996	64.7%	67.3%	55.2%	48.6%	52.7%	56.7%	*	66.7%	48.3%	61.2%	n/a	n/a
Class of 1995	64.8%	66.5%	54.6%	48.1%	23.9%	61.7%	-	*	55.4%	53.7%	n/a	n/a
Mean SAT I Score												
Class of 1996	993	1008	989	908	951	1013	*	923	1047	946	n/a	n/a
Mean ACT Score												
Class of 1996	20.1	20.7	21.2	19.1	21.5	21.6	-	*	22.8	20.4	n/a	n/a
Class of 1995	20.0	20.5	21.9	18.0	22.9	22.4	-	*	21.9	21.8	n/a	n/a

Figure 1

Information Flow for the Web Using SAS

Figure 2

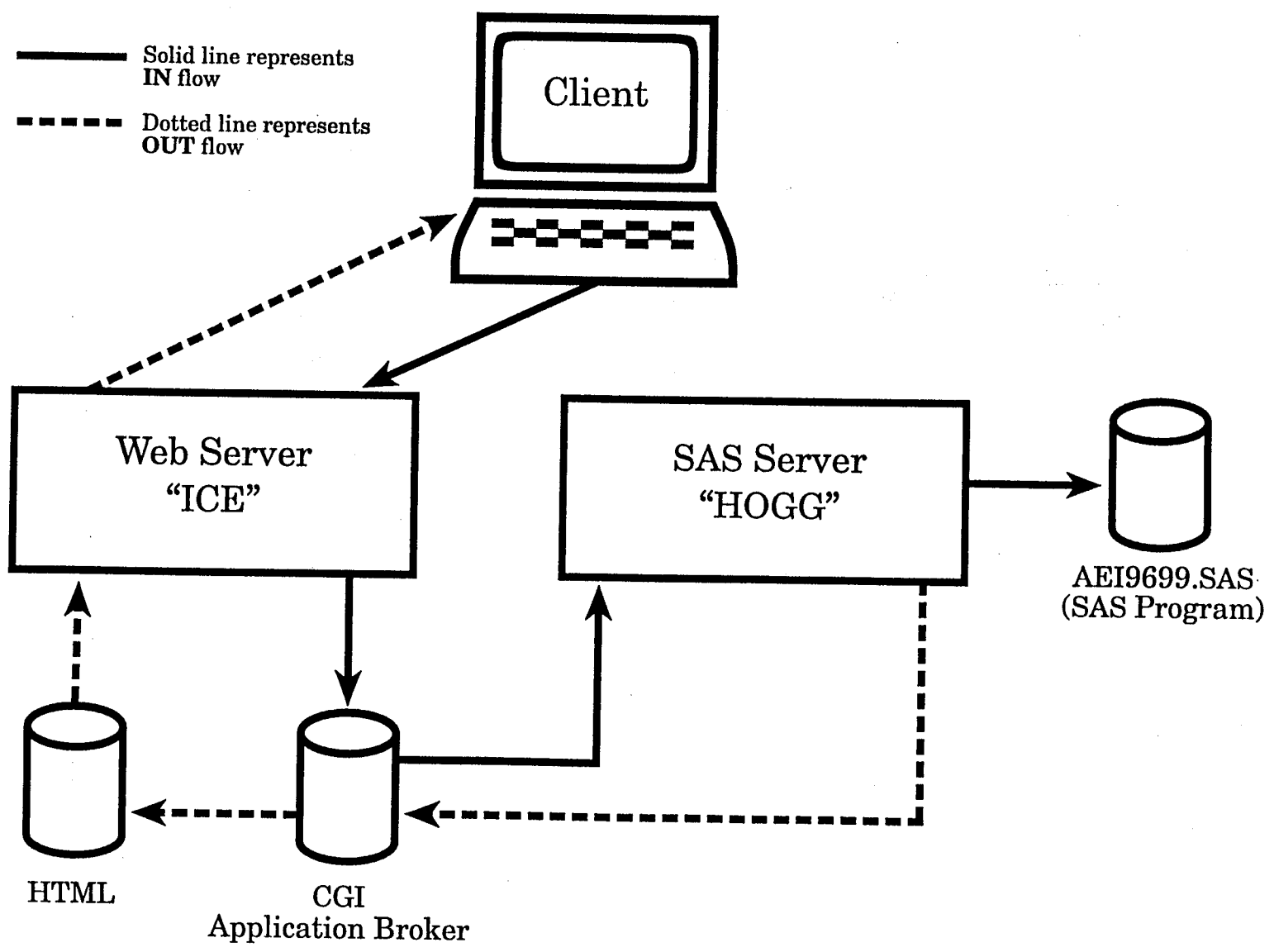


Figure 3

```

<HTML>
<HEAD>
<TITLE>Academic Excellence Indicator System, Campus Report, 1996-97 </TITLE>
<P>
</HEAD>
<BODY BGCOLOR="#FFFFFF">
<CENTER>
<H2>
<IMG SRC="/perfreport/images/g_aeis97campus.gif" Align=center ALT="1997
Campus AEIS Report">
</H2>
</CENTER>
<BR>
<BR>
<P>
<FORM METHOD="GET" ACTION="/cgi/broker">
<INPUT TYPE="HIDDEN" NAME=_SERVICE VALUE="hogg">
<INPUT TYPE="HIDDEN" NAME=_PROGRAM VALUE="teasampl.camp97.sas">
You can search for a school by entering the number or the name of the school,
or you can search by district name.
<BR>
<B>This search takes a minimum of 15 seconds!</B>
</P>
How do you wish to search?
<UL>
<input type=radio name="search" value="district">Campus by District Name<BR>
<input type=radio name="search" value="campname">Campus Name<BR>
<input type=radio name="search" value="campnum">Campus Number<BR>
</UL>
<P>
Enter the appropriate name or number:
<BR>
When entering the name, do not include the type of school (EL, JR, HS). For
example, enter Travis, not
Travis EL.
</P>
<TR><TD align=left>
<input type=text name="namenum" size=20>
<TD align=right><input type=submit value="View"><TD align=left><input type=reset
value="Reset Values">
</FORM>
<CENTER>
<HR>
<P>
<P align=center><A HREF="faq.html"><B>Frequently Asked Questions</B></A>
<P align=center><A HREF="./glossary.html"><B>AEIS Glossary</B></A>
<P align=center><A HREF="/perfreport/index.html"><B>Back to the Performance
Reporting home page</B></A>
<P align=center><A HREF="http://www.tea.state.tx.us"><B>Back to the TEA home
page</B></A>
<HR>
</CENTER>
</BODY>
</HTML>

```