

## Ignorance is not bliss – Understanding SAS® products and components

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### ABSTRACT

Have you ever heard ‘SAS Display Manager’ in a presentation or discussion, and wondered to yourself, what exactly is SAS® Display Manager? Or have you come across ‘SAS/SQL’ or ‘SAS/Macros’ in a job description and thought that SQL or Macros are separate package modules of the SAS System. There’s a fair amount of confusion and misinformation regarding SAS products, and what they’re composed of, even amongst experienced SAS users. In this paper, I attempt to provide a proper understanding of SAS components, and distinguish between SAS applications and SAS modules. Also, I show how to determine what products are licensed and installed in the SAS windowing environment.

### INTRODUCTION

The SAS System consists of a vast reservoir of software applications, interfaces, products, modules and components. Some SAS users aren’t aware of the SAS applications or versions they use. Popular SAS applications include SAS display manager, which is the standard SAS interface, and SAS Enterprise Guide®, a newer point-and-click client application. Many recruiters of SAS positions aren’t familiar with the term Base SAS® or don’t know what it means. Some users consider Base SAS to be an application. Base SAS is really the foundation module of SAS. In and of itself, Base SAS is an extensive package and consists of a tremendous amount of programming constructs and code. Other SAS modules share similar misconceptions among SAS users.

### SAS KNOWLEDGE IN INDUSTRY

#### THIRD PARTY RECRUITERS

Job placement professionals hold one level of SAS knowledge. Many companies hire SAS programmers through external recruiters, and maintain preferred vendor lists. These third party recruiters are firms which are retained by companies to find job candidates. In my experience, third party recruiters possess the least amount of actual knowledge about SAS products and components. Although it depends on the kind of recruiter. Many of these recruiters search internet job boards to find candidates. They don’t write job descriptions, and receive position requirements from their clients instead.

In terms of specific SAS tools, many third party recruiters assume there’s only one SAS software program. They don’t distinguish between different SAS software applications. Some wrongly assume that a candidate’s fit for the position if they have ‘SAS’ experience. This is because they haven’t considered the candidate’s SAS skillset or their detailed SAS experience. Figure 1 is a sample job description.

- This will require a lot of data validation work, comparing files, tracking changes and etc.
- 5-7 year experience in SAS - Looking for a candidate very experienced with SAS.
- Candidate should be able to use SAS to query database and import different type of files.
- Must be very detail oriented.

#### Figure 1. SAS Job description

This description calls for ‘5-7 year experience in SAS’. What do they mean by ‘SAS’? What SAS software packages or applications does their client use? The description isn’t clear in terms of SAS products. I once was recruited for a SAS BI developer position, and they wanted someone well versed in SAS BI. My work experience was a BASE SAS programmer. The recruiter submitted my resume for the position to the client. But, I didn’t think I was a fit for the position because I didn’t have the specific experience they were looking for.

## TYPE OF RECRUITERS

Knowledge of SAS usually varies with the kind of recruiter. General placement recruiters recruit across a wide-range of disciplines and specializations. Because their focus is so broad, they have the least amount of SAS knowledge. IT recruiters have a narrower focus, and have more knowledge of SAS. I've been asked questions from IT recruiters such as 'Is SAS an ETL tool?' or 'Compare SAS to Microstrategy?' Perhaps this is because SAS is niche-oriented, and not the most common IT application. Firms such as Smith Hanley or Experis recruit exclusively for SAS-related positions, and have a larger base of knowledge of SAS. Also, HR corporate recruiters tend to be better informed about SAS.

## SAS APPLICATIONS

### SAS DISPLAY MANAGER

Ignorance of SAS applications is not uncommon. During job interviews, I've expressed that I have programming experience using the SAS display manager application. Consequently I'm asked 'What is SAS display manager?' I explain that SAS display manager is the standard SAS programming interface.

SAS users refer to display manager as 'Interactive SAS', or 'The SAS windowing environment'. Historically, when you purchased SAS, you were given the Base SAS license, and SAS Display Manager. This might have changed with SAS release 9.4, with SAS Studio becoming the default application when you purchase SAS. As figure 2 shows, SAS display manager consists of multiple windows, such as Enhanced Editor, Log, Output, Results, and Explorer.

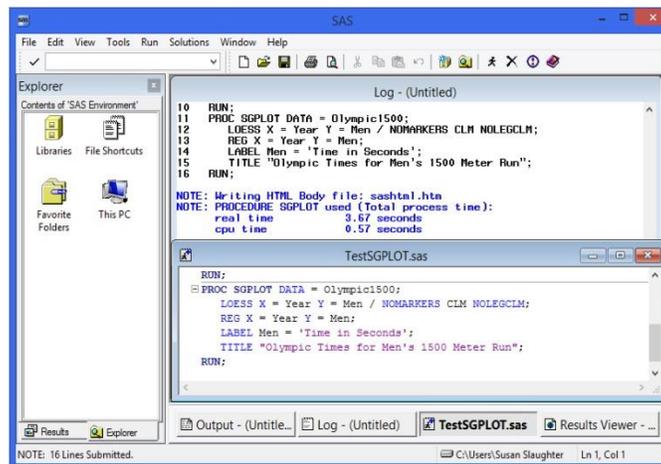


Figure 2. SAS display manager

### SAS ENTERPRISE GUIDE

SAS Enterprise Guide is a newer desktop SAS client application. SAS Enterprise Guide is usually provided complimentary when you purchase and license SAS. SAS Enterprise Guide is geared toward analysts with a non-technical background, but also includes programming features. Enterprise Guide allows the user to accomplish the same tasks using a menu-driven and wizard-driven Windows GUI. Enterprise Guide also features a code-generating capability, through its built-in tasks. Users can write any SAS code in EG, but many don't realize EG is limited in the code it can generate through task wizards. The latest release is EG 7.1, but versions 6.1, 5.1, and 4.3 are still in circulation.

## SAS UNIVERSITY EDITION

SAS University Edition® is a free version of SAS that's available for download from the SAS website. It's intended for academic, non-commercial use, or independent learners who want extra practice using SAS. SAS University Edition is a virtual application that's accessed online, through virtualization software such as Oracle Virtual Box. SAS University Edition comes with several SAS packages, including Base SAS, SAS/ACCESS® Interface to PC Files, SAS/STAT®, SAS/IML®, and SAS/ETS®. SAS University Edition features the SAS Studio application. SAS Studio features programming editors for writing code, and built-in tasks with code-generating capabilities similar to Enterprise Guide.

## SAS MODULES

What is a SAS module? A SAS module is a software package, which can also be thought of as a SAS product. Each SAS module refers to a distinct area of capabilities of SAS software. Of course, SAS includes many modules besides Base SAS. The SAS/GRAPH module provides extensive graphics capabilities, such as line graphs, stacked bar charts, and 3-D pie charts. There is some overlap between SAS modules. For example, Base SAS includes basic graphing capabilities with PROC CHART, PROC PLOT, and ODS GRAPHICS.

The naming convention for most modules includes 'SAS', and a forward slash('/'), followed by the name of the package. Generally speaking, each module requires a specific license. Most modules of SAS require a single license. There are some SAS modules which are broad enough to encompass several sub-modules. The SAS/ACCESS module consists of multiple sub-modules. Table 1 lists the different modules of SAS Software.

| SAS Modules  |             |              |
|--------------|-------------|--------------|
| Base SAS®    | SAS/ETS®    | SAS/QC®      |
| SAS/ACCESS®  | SAS/EIS®    | SAS/IML®     |
| SAS/STAT®    | SAS/FSP®    | SAS/INTRNT®  |
| SAS/GRAPH®   | SAS/AF®     | SAS/GIS®     |
| SAS/CONNECT® | SAS/OR®     | SAS/INSIGHT® |
| SAS/SHARE®   | SAS/SECURE® | SAS/ASSIST®  |

Table 1. SAS Modules

## BASE SAS

Occasionally I run across user comments that incorrectly identify Base SAS. Some SAS users believe Base SAS is a software application, and contrast it with Enterprise Guide. If they refer to Base SAS having an interface, they're probably thinking of SAS display manager. Usually these opinions are held by those who use SAS for analytical, rather than technical tasks. In Figure 3 is an excerpt from a SAS user who confuses modules with applications.

As everybody has explained and made it clear very well, Base SAS has somewhat an old interface than Enterprise Guide. As per my knowledge, there are some really useful features that differentiate BASE SAS from SAS EG.

Figure 3. SAS User statement

The difference between Base SAS and applications such as Display Manager and EG, is a technical distinction. Base SAS is a software package, not a software application or interface. It's the foundation module of SAS Software. Base SAS is supported and accessed through many SAS applications, including SAS display manager, Enterprise Guide, and SAS Studio. The Base SAS module encompasses a set of programming structures and constructs for reading, manipulating, transforming, and analyzing data.

Probing deeper, Base SAS components are another misunderstood aspect of SAS. Frequently, I've come across job descriptions that include an invalid description of Base SAS components. The description in Figure 4 shows an example.

- 7+ years SAS Programming, SAS/BASE, SAS ETL, SAS/SQL, extensive data conversions,
- Linux OS and financial services or Mainframe is a plus

**Figure 4. Job description with SAS components.**

This description incorrectly lists SAS ETL as a SAS component. By SAS ETL, the description probably is referring to SAS/ACCESS. Also, SAS/SQL is incorrectly listed as a SAS module. Here, the actual SAS component is PROC SQL which is a programming construct included in Base SAS.

As the foundation module, Base SAS is quite extensive. It encompasses the SAS programming language. Base SAS includes programming structures for generating descriptive statistics, producing summary and detail reports, merging and joining tables, concatenating datasets, reading external text files, reconciling different versions of SAS data sets, and automating or executing repeatable processes. Table 2 below lists the programming constructs that are included in Base SAS.

| Base SAS Components          |                |
|------------------------------|----------------|
| DATA STEP                    | PROC TRANSPOSE |
| MACROS                       | PROC SQL       |
| OUTPUT DELIVERY SYSTEM (ODS) | PROC REPORT    |
| PROC SORT                    | PROC TABULATE  |
| PROC APPEND                  | PROC COMPARE   |
| PROC MEANS                   | PROC IMPORT    |
| PROC DATASETS                | PROC EXPORT    |

**Table 2. Base SAS constructs**

### **SAS/ACCESS**

SAS/ACCESS® is the SAS module for reading and writing to external files and databases. It's common for SAS users to equate SAS/ACCESS with SAS/ACCESS for relational databases. Also, SAS/ACCESS brings to mind components such as the SAS/ACCESS Libname, and the SQL-pass through facility. These are SAS/ACCESS components, but it's not limited to them. SAS/ACCESS consists of multiple specific packages and licenses.

Each SAS/ACCESS module accesses a different set of file types, and requires a separate license. SAS/ACCESS for PC Files gives you the capability to read and access files from a number of popular PC programs, including Microsoft Excel, Microsoft Access, Dbase, and others. SAS/ACCESS for Relational Databases provides the capability of connecting to DBMS systems and consists of multiple interfaces. There are separate SAS/ACCESS interfaces and engines for SQL Server, Oracle, Teradata, DB2, and ODBC. Each interface has a separate license. There are also SAS/ACCESS interfaces for connecting to non-relational databases, such as ADABAS.

## SAS LICENSES

It's important to know what SAS modules and products are licensed and installed at your site. SAS users might make an assumption regarding tools that are available in their version of SAS. Some SAS users might assume if a SAS component is purchased and licensed then it's installed in their version of SAS. If the component is used, then SAS will issue a warning message indicating no access to the product. Base SAS includes procedures for determining specific SAS products that have been licensed and installed, such as PROC SETINIT, and PROC PRODUCT\_STATUS.

### PROC SETINIT

PROC SETINIT is the procedure which allows the user to update or apply his license to the SAS system. When you first license SAS or renew your SAS license, you'll receive a setinit file or SID file which contains detailed information about the products you've licensed and the expiration dates of each. You need to run PROC SETINIT to apply or update the SAS license. Figure 5 shows a SAS log that pertains to PROC SETINIT.

```
62 Proc Setinit;
63 Run;

NOTE: PROCEDURE SETINIT used (Total process time):
real time    0.00 seconds
cpu time     0.00 seconds

Original site validation data
Current version: 9.04.01M4P110916
Site name: 'UNIVERSITY EDITION 2.5 9.4M4'.
Site number: 70208402.
CPU A: Model name="" model number="" serial="+2".

Expiration: 16JUN2018.
Grace Period: 0 days (ending 16JUN2018).
Warning Period: 45 days (ending 31JUL2018).
System birthday: 10APR2017.
Operating System: LIN X64 .
Product expiration dates:
---Base SAS Software 16JUN2018 (CPU A)
---SAS/STAT 16JUN2018 (CPU A)
---SAS/ETS 16JUN2018 (CPU A)
---SAS/IML 16JUN2018 (CPU A)
---SAS/ACCESS Interface to PC Files 16JUN2018 (CPU A)
---SAS/IML Studio 16JUN2018 (CPU A)
---SAS Workspace Server for Local Access 16JUN2018 (CPU A)
```

Figure 5. SAS log of Proc Setinit

### PROC PRODUCT\_STATUS

To discover which SAS components are installed on your system, I recommend PROC PRODUCT\_STATUS. PROC PRODUCT\_STATUS is included in the Base SAS package, and it provides the user with a list of each SAS component that's installed on your system. In addition, for each SAS module, it lists the specific version that's installed. Users should use PROC PRODUCT\_STATUS to document a SAS configuration or installation for a specific site. Figure 6 contains a SAS log generated from PROC PRODUCT\_STATUS.

```

62 Proc Product_Status;
63 Run;

For Base SAS Software ...
Custom version information: 9.4_M4
Image version information: 9.04.01M4P110916

For SAS/STAT ...
Custom version information: 14.2

For SAS/ETS ...
Custom version information: 14.2

For SAS/IML ...
Custom version information: 14.2

For High Performance Suite ...
Custom version information: 2.2_M5

For SAS/ACCESS Interface to PC Files ...
Custom version information: 9.4_M4

NOTE: PROCEDURE PRODUCT_STATUS used (Total process time):
real time    0.01 seconds
cpu time     0.02 seconds

```

**Figure 5. SAS log of Proc Product\_Status**

## CONCLUSION

SAS consists of an extensive suite of applications, interfaces, packages, products, and modules. Knowledge of SAS components varies between HR and recruiting professionals, programmers, and more casual SAS users such as statistical analysts. Even among recruiting professionals, knowledge of SAS varies between types of recruiter. The most common SAS applications are SAS display manager, SAS Enterprise Guide, and SAS University Edition or SAS Studio. Base SAS is the foundation of the SAS system, but is a module, not an application or interface. There are more than 15 different modules in SAS. To discover the modules licensed at your site, use PROC SETINIT. To discover modules installed at your site, use PROC PRODUCT\_STATUS.

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