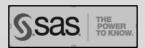# What's New in SAS® 9.4

WILLIAM KNABE

FORMER DIRECTOR OF STATISTICAL APPLICATIONS,
UI INFORMATION TECHNOLOGY SERVICES
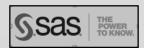
FRED ULLRICH

RESEARCH SPECIALIST, HUMAN MANAGEMENT & POLICY,
UI COLLEGE OF PUBLIC HEALTH

§.sas | THE POWER TO KNOW.

The biggest change in SAS® 9.4?

SAS 9.4 Overview

$$+0.1$$

SAS 9.4 Overview

9.4 (TS1M0)

SAS 9.4 Overview

98 pages!!

SAS 9.4 Overview

- Availability at University of Iowa

- Data Manipulation

- New Programming Languages

- New and Improved Procedures

- Output Delivery Enhancements

- New Output Destinations

- Other New Features

Availability at University of Iowa

- Campus Site License

- Virtual Desktop and Stand Alone Implementation

- 32-bit and 64-bit Options

Data Manipulation

▪ **Create Customized Attributes for Data Sets and Variables**

You can now create descriptive attributes for data sets and variables to contain information that you supply by using *extended attributes*. Extended attributes become part of the data set and are managed with the DATASETS procedure. The procedures that process data sets, such as CPORT, DOWNLOAD, and SQL, support extended attributes.

EXTENDED ATTRIBUTES

Example

```
DATA MYSALES;
 PURCHASE = "CAR"; AGE = 37; CARS = 3;
RUN;

PROC DATASETS NOLIST;
   MODIFY MYSALES;
       XATTR ADD DS MYLABEL="THIS LABEL CAN BE AS LONG
                                 AS I NEED IT TO BE, WITH LOTS
                                 OF DETAILS ABOUT THIS DATA SET.";
       XATTR ADD VAR AGE ( MEAN = 30 )
                      CARS ( MAKER = "FERRARI" MODELS=4 );
RUN;
QUIT;
```

▪ **Provide support for Microsoft Excel Functions**

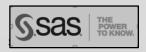A link and supporting text were added to provide support for Excel functions within SAS program code.

New Programming Languages

- DS2

- FedSQL

New Programming Languages

- DS2 is a new SAS proprietary programming language that is appropriate for advanced data manipulation.

- DS2 is included with Base SAS.

- DS2 language is complementary to DATA step language and intersects with the SAS DATA Step.

- DS2 run-time-generated queries can exchange data interactively between DS2 and any supported database.

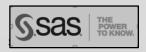- DS2 has a simplified execution framework which results in faster execution.

DS2 Procedure
Key Features

- ✓ Component of Base SAS
- ✓ Integrates with the SAS DATA Step
- ✓ ANSI SQL types
- ✓ Well defined programming structure
- ✓ Customized user-defined methods

FedSQL Procedure

- Enables submittal of FedSQL language statements within a Base SAS session.

- FedSQL conforms to ANSI SQL 1999 standard; conformity allows queries in the native data type of the DBMS, resulting in faster processing.

- FedSQL supports multiple data source queries and aggregation of results.

- FedSQL distributes queries in parallel across multiple data sources.

- FedSQL explicit pass-through facility enables connecting directly to the DBMS.

- FedSQL implicit pass-through provides a common SQL syntax across all data sources.

FedSQL Procedure
Key Features

- ✓ ANSI SQL 1999 compliant
- ✓ Enhanced data type – DECIMAL, INTEGER and VARCHAR
- ✓ Expanded DBMS interfaces
- ✓ Parallel processing

New and Improved Procedures

The following procedures are new:

- PROC AUTHLIB

- PROC DELETE

- PROC D52

- PROC FEDSQL

- PROC JSON

- PROC PRESENV

- PROC STREAM

New and Improved Procedures

The following procedures have been improved:

- PROC APPEND
- PROC CONTENTS
- PROC COPY
- PROC DATASETS
- PROC EXPORT
- PROC FCMP
- PROC HADOOP

- PROC IMPORT
- PROC MIGRATE
- PROC QDEVICE
- PROC XSL
- PROC PWENCODE
- PROC SORT

New and Improved Procedures

- **PROC DELETE** – The DELETE procedure is back! SAS 9.4 includes a faster and officially supported version of this legendary SAS proc. This new release can actually do a better and faster job of cleaning up your SAS data libraries than PROC DATASETS.

- **PROC PRESENV** – Preserves the Work library data sets and catalogs, and the values of global statements, macro variables, and system options from one SAS session to another.

- **PROC SORT** – Supports extended (customized) attributes for data sets and variables that are defined in the DATA step and copies these attributes to the output data set. The International Components for Unicode (ICU) have been upgraded to version 4.8. Special Note: Data sets sorted linguistically by one release of SAS might not be recognized as sorted by another release due to differences in ICU versions.
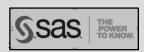
New and Improved Procedures

Noteworthy Statistical Changes:

- The CORR procedure can now create an output data set that contains polychoric correlation statistics and an input data set that contains polyserial correlation statistics.

- The FREQ procedure now provides score confidence limits for the odds ratio and relative risk and displays them in the corresponding plots, produces mid p-values for exact tests, colors mosaic plot titles according to the values of the Pearson residuals or the standardized residuals, and displays the Pearson residuals in the CROSSLIST table.

- The UNIVARIATE procedure now enables you to overlay histograms associated with different levels of a CLASS variable onto a single plot.

- The HPGENSELECT procedure now offers model selection for generalized linear models.

New and Improved Procedures

- The experimental BCHOICE procedure now offers Bayesian analysis for discrete choice models.

- The new ICLIFETEST procedure performs nonparametric survival analysis for interval-censored data.

- The NLMIXED procedure enables you to specify more than one RANDOM statement in order to fit hierarchical nonlinear mixed models.

- The experimental IRT procedure fits item response models.

- The competing risk model of Fine and Gray (1999) is now available in the PHREG procedure.

- You can now compute power for PROC GLM-type MANOVA and repeated measurements with the GLMPOWER procedure.

Output Delivery Enhancements

- HTML is also now the default style for <u>batch</u> processing.

- ODS Graphics Designer introduces an Auto Charts feature that generates a variety of graphs automatically, based on your data.

Improved ODS Report Writing Interface (RWI) - 1

- You can create and manipulate predefined ODS objects in a DATA step which results in highly customized output.

- You can now create table, text and list templates.

- You can arrange ODS output objects exactly where you want them to appear on a page or use dynamic placement of objects by using a grid structure.

- You can animate multi-page GIF images and SVG files by setting system options.

Improved ODS Report Writing Interface (RWI) - 2

```
data _null_;
   set sashelp.cars end=eof;


if _n_ = 1 then do;
dcl odsout obj();
   obj.table_start();
end;


obj.row_start();
   obj.format_cell(data: make, style_attr: "color=red");
   obj.format_cell(data: model, style_attr: "color=blue");
obj.row_end();


if eof then do;
   obj.table_end();
end;
run;
```

Acura	MDX
Acura	RSX Type S 2dr
Acura	TSX 4dr
Acura	TL 4dr
Acura	3.5 RL 4dr
Acura	3.5 RL w/Navigation 4dr
Acura	NSX coupe 2dr manual S
Audi	A4 1.8T 4dr
Audi	A41.8T convertible 2dr
Audi	A4 3.0 4dr
Audi	A4 3.0 Quattro 4dr manual

Enhanced ODS Graphics

Changes to PROC SGPLOT

- **Jitter –** the act of adding random noise to data in order to prevent overplotting in statistical graphs.

  Example:

```
proc sgplot data=sashelp.cars;
  where type ne 'Hybrid';
  scatter x=mpg_city y=type / jitter
                filledoutlinedmarkers
                markerattrs=(size=9 symbol=circlefilled)
                markeroutlineattrs=(thickness=0)
                markerfillattrs=graphdata1
                dataskin=sheen;
  xaxis grid;
  yaxis display=(nolabel) offsetmin=0.12;
run;
```
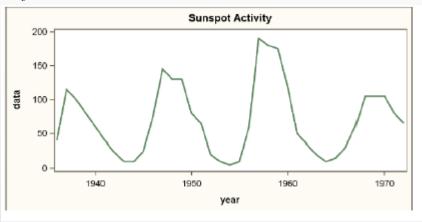
Enhanced ODS Graphics

▪ **Smooth Connect –**

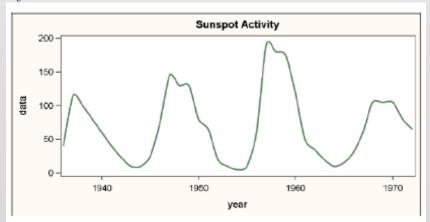 a new sub-pixel rendering feature provides smoother curves for line charts and more consistent spacing in bar charts.

Example:

```
proc sgplot data=sunspot;
   series x=year y=data /
smoothconnect
lineattrs=(thickness=2);
run;
```
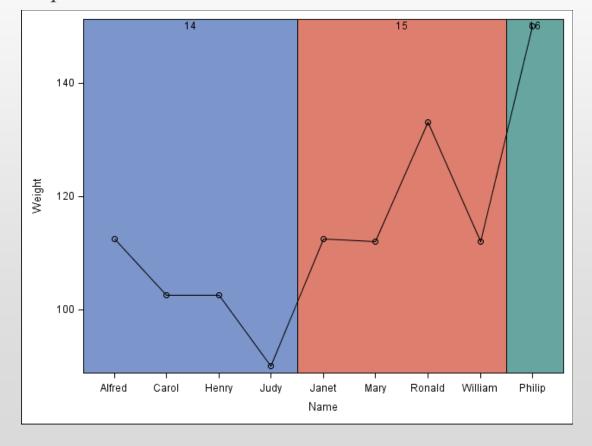
Before:

After:

Enhanced ODS Graphics

Block Statement

Example:

proc sort data=sashelp.class
out=class;
  by age name;
run;

proc sgplot data=class;
where age>13;
    block x=name block=age;
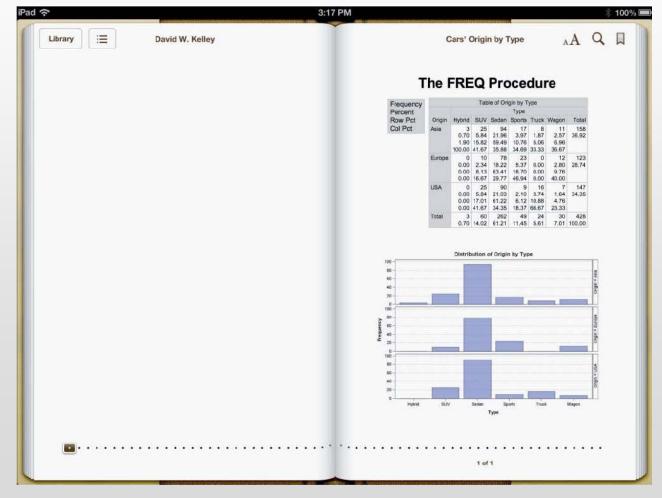   series x=name y=weight / markers;
run;

Output:

New Output Destinations

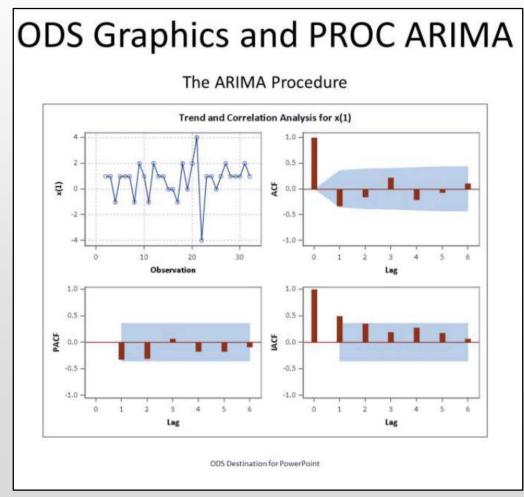- **ODS EPUB**
- **ODS POWERPOINT**
- **ODS HTML5**

ODS EPUB

ODS EPUB – Outputs SAS results to eBook format for viewing on iPad & iPhone

ODS POWERPOINT

ODS POWERPOINT – Exports selected SAS results to Microsoft PowerPoint.

ODS POWERPOINT
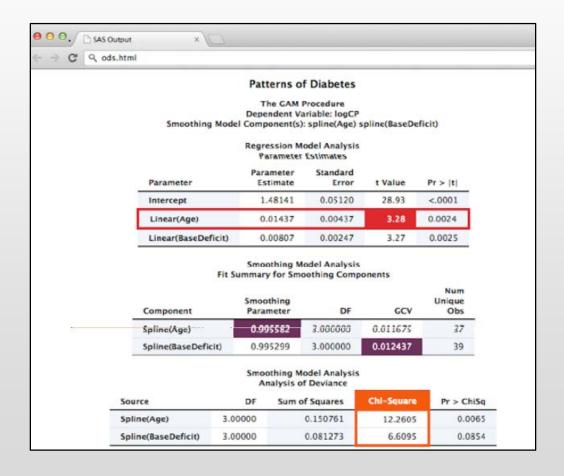
ODS POWERPOINT – Produces TwoContent layout, meaning the combining of SAS results from two separate runs into one PowerPoint table.

ODS HTML5

ODS HTML5 – Creates HTML5 output for SAS reports to support delivery to any web browser that is HTML5-compatible.

Other New Features

- **Zip Files** – A new ZIP Access Method allows you to read and write *.zip* files from within the SAS program. The contents of the zipped file are read directly; no extraction is performed.

- **Time Zones** – The SAS language now supports time zones based on Universal Coordinate Time (UTC). Data sets and catalog time stamps can specify the time based on a specific time zone. You can specify an area of the world and SAS can determine the time for that area, taking into account Daylight Saving Time.

- **SAS Enterprise Guide** – A new release (6.1) of this "point and click" version of the SAS Base System. New features and enhancements for this release include:

  - Improved programmer productivity and program management; new Log Summary Window lists all the errors, warnings, and notes generated during program execution, as well as related line numbers and a sample of the affected code.

  - New tasks including SAS Rapid Predictive Modeler, High-Performance Logistic and High-Performance Linear Regression.

  - Better documentation; can use Sticky Notes to add information about a process flow or specific objects in the process flow.

Other New Features

- **SAS Studio** – Included with SAS 9.4, SAS Studio (*Release 3.1*) allows you to write and run SAS code through a web browser. Special features include:

  - Access to data files, libraries and existing programs using web browser.

  - Submit code from a variety of devices – IPAD, IPhone, Mac and Windows desktop or laptop.

  - SAS Studio processes the SAS code on a SAS server and returns results to the browser.

  - Functionality is similar to Enterprise Guide – code generating tasks, auto-complete for SAS procedures, and process flows.

- **SAS/Graph –** Ability to produce "Google-Like" maps.

- **SAS/Secure** – Now included with Base SAS.

Learn More

- Documentation

  What's New in SAS® 9.4
  http://support.sas.com/documentation/cdl/en/whatsnew/64788/PDF/default/

  SAS® Enterprise Guide® 6.1
  http://support.sas.com/software/products/guide/index.html

- Papers

  Parallel Data Preparation with the DS2 Programming Language
  http://support.sas.com/resources/papers/proceedings14/SASA329-2014.pdf

- Training

  DS2 Programming Essentials
  http://support.sas.com/edu/schedules.html?id=1798&ctry=US

- Tutorial

  Getting Started with SAS Studio
  http://support.sas.com/training/tutorial/studio/get-started.html

THANK YOU!

CONTACT: william-knabe@uiowa.edu

fred-ullrich@uiowa.edu