



# Free Online SAS® Resources

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Boston Area SAS Users Group (BASUG)

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## Free Online SAS® Resources

This talk will highlight a number of free, self-study, SAS resources available on the web. Some of these you may know about; some, you may not. The resources range from basic tutorials to materials on the latest SAS technologies.

Paul Grant is a retired Senior Technical Architect at SAS Institute. The organizations he supported during his 17 years with SAS include the U.S Treasury Department, the U.S. Joint Chiefs of Staff, and the FBI. He chaired SUGI 21 in Chicago in 1996 and co-chaired NESUG '94 in Philadelphia. He has been active in the Boston Area SAS Users Group since 1983. He has been developing systems with SAS since 1981.



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# Agenda

- SAS® Conference Proceedings
- Software
- support.SAS.com
- Documentation
- Videos & Tutorials
- e-Learning courses
- Ask the Expert Webinars
- e-Books & Tip Sheets
- SAS Blogs
- SAS Communities

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## SAS Conference Proceedings: lexjansen.com

The screenshot shows a web browser displaying the website [lexjansen.com](http://lexjansen.com). The page features a navigation bar with social media icons (LinkedIn, Twitter, Facebook, YouTube, RSS) and a search bar. The main content area is titled "SAS Conference Proceedings (1976 - present) ... and more". It includes a search box with the text "This searches 33552 conference papers from SAS Global Forum, SUGI, PharmaSUG, PhUSE, NESUG, SESUG, WUSS, MWSUG, PNWSUG, SCSUG, SEUGI, ..." and a "Google Custom Search" button. Below the search bar, there are several boxes providing information about conference proceedings:

- 340 papers presented at PHUSE US Connect 2018-2019.**  
PHUSE US Connect 2020  
March 8-11, Orlando, FL
- 12355 papers presented at SUGI / SAS Global Forum 1976-2019.**  
SAS Global Forum 2020  
March 29 - April 1, Washington, DC
- 242 posters presented at PHUSE/FDA CSS 2012-2019.**  
PHUSE CSS 2020  
June 7-9, Silver Spring, MD
- 3287 papers presented at PharmaSUG 1997-98, 2000-2019.**  
PharmaSUG 2020  
May 10-13, San Francisco, CA
- 388 papers presented at PharmaSUG China 2012-2019.**  
PharmaSUG China 2019  
August 30-31, Shanghai, China
- 2816 papers presented at WUSS 1993-2019.**  
WUSS 2020  
September 9-11, San Diego, CA

On the left side of the page, there is a vertical sidebar with the text "Gone but not forgotten" and three small images of people. At the bottom right, there is a disclaimer: "Lex Jansen is a SAS employee. The views expressed on this website do not represent the views of SAS. Contact me."

lexjansen.com

 <p>340 papers presented at <a href="#">PHUSE US Connect</a> 2018-2019.</p> <p>PHUSE US Connect 2020 March 8-11, Orlando, FL</p>	<p>12355 papers presented at <a href="#">SUGI / SAS Global Forum</a> 1976-2019.</p> <p>SAS Global Forum 2020 March 29 - April 1, Washington, DC</p>	<p>242 posters presented at <a href="#">PHUSE/FDA CSS</a> 2012-2019.</p> <p>PHUSE CSS 2020 June 7-9, Silver Spring, MD</p>
<p>3287 papers presented at <a href="#">PharmaSUG</a> 1997-98, 2000-2019.</p> <p>PharmaSUG 2020 May 10-13, San Francisco, CA</p>	<p>388 papers presented at <a href="#">PharmaSUG China</a> 2012-2019.</p> <p>PharmaSUG China 2019 August 30-31, Shanghai, China</p>	<p>2816 papers presented at <a href="#">WUSS</a> 1993-2019.</p> <p>WUSS 2020 <u>September 9-11, San Diego, CA</u></p>
<p>2111 papers presented at <a href="#">MWSUG</a> 1990-2019.</p> <p>MWSUG 2020 September 13-17, Pittsburgh, PA</p>	<p>1341 papers presented at <a href="#">SCSUG</a> 1991-2018.</p> <p>SCSUG 2019 October 17-18, Baton Rouge, LA</p>	<p>3017 papers presented at <a href="#">SESUG</a> 1993-2019.</p> <p>SESUG 2019 October 20-22, Williamsburg, VA</p>
<p>1696 papers presented at <a href="#">PHUSE EU Connect</a> 2005-2018.</p> <p><b>PHUSE EU Connect 2019</b> Nov 10-13, Amsterdam, Netherlands</p>	<p>3123 papers presented at <a href="#">NESUG</a> 1988-2013.</p> <p>115 papers presented at <a href="#">VIEWS</a> 2001-2004.</p>	<p>286 papers presented at <a href="#">PNWSUG</a> 1996-1998, 2004-2009.</p> <p>2435 papers presented at <a href="#">SEUGI</a> 1983-2003.</p>
<p>1569 papers and posters related to <a href="#">CDISC</a> 2001-2019.</p>		

Midwest SAS Users Group 2019 | lexjansen.com/cgi-bin/xsl\_transform.php?x=mwsug2019#MWSUG2019-rf081

Search MWSUG Papers

25 Search results

## SAS Conference Proceedings: Midwest SAS Users Group 2019

September 29 - October 1, 2019, Chicago, Illinois, 81 papers

[MWSUG 2019](#) [MWSUG 2018](#) [MWSUG 2017](#) [MWSUG 2016](#) [MWSUG 2015](#) [MWSUG 2014](#) [MWSUG 2013](#) [MWSUG 2012](#) [MWSUG 2011](#) [MWSUG 2010](#)  
[MWSUG 2009](#) [MWSUG 2008](#) [MWSUG 2007](#) [MWSUG 2006](#) [MWSUG 2005](#) [MWSUG 2004](#) [MWSUG 2003](#) [MWSUG 2002](#) [MWSUG 2001](#) [MWSUG 2000](#)  
[MWSUG 1999](#) [MWSUG 1998](#) [MWSUG 1997](#) [MWSUG 1996](#) [MWSUG 1995](#) [MWSUG 1994](#) [MWSUG 1993](#) [MWSUG 1992](#) [MWSUG 1991](#) [MWSUG 1990](#)

[Original source: <https://www.mwsug.org/2019-proceedings.html>]

### Midwest SAS Users Group 2019: Best Papers and honorable mentions

[Track SAS Viya user logins to identify usage and drive improvement using actionable intelligence: navigate visual reports, track KPIs and visualize long term trends.](#)  
 Anurag Kulkarni, Revspring (*Best Paper in Analytics*)  
[Explore your data before you rush to analysis, you will thank me later: explorations in cross section data](#)  
 Steven Myers, The University of Akron (*Best Paper in Business Leadership*)  
[Base SAS® & SAS® Enterprise Guide® Automate Your SAS® World with Dynamic Code ~ Forwards & Backwards](#)  
 Kent Phelps, Illuminator Coaching, Inc.; Ronda Phelps, Illuminator Coaching, Inc. (*Best Paper in Hands On Workshop*)  
[Classifying Risk in Life Insurance using Predictive Analytics](#)  
 Sai Gopi Krishna Govindarajula, Oklahoma State University (*Best Paper in Industry*)  
[3 ways to get Pretty Excel-Style Tables: PROC REPORT, PROC TABULATE, and Help from SAS Enterprise Guide®](#)  
 Brooke Ellen Delgoffe, Marshfield Clinic Research Institute (*Best Paper in Rapid Fire*)  
[Powerful SAS® Output Delivery with ODS EXCEL](#)  
 LeRoy Bessler, Bessler Consulting and Research (*Best Paper in SAS 101 Plus*)  
[Profiling hospital length of stay using the mode](#)  
 Anne Cain-Nielsen, University of Michigan; Scott Regenbogen, University of Michigan (*Best Paper in e-Poster*)

[Analytics](#)  
[Business Leadership](#)  
[Hands On Workshop](#)  
[Industry](#)  
[Rapid Fire](#)  
[SAS 101 Plus](#)  
[e-Poster](#)

# SAS® University Edition

- Basic SAS learning environment geared for academics and independent learners ( anybody! )
- Includes Base SAS®, SAS/STAT®, SAS/IML®, SAS/ACCESS® Interface to PC Files and SAS® Studio
- Runs on virtualization software (VirtualBox or VMware) on a Windows PC, Mac, or Linux workstation and AWS
- **Free** if used for noncommercial, learning purposes
- Annual license that needs to be renewed (ends Jul 31), and you typically also have to install the latest updates

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## Free SAS Software

The screenshot shows a web browser window displaying the SAS Academic Programs Software page. The page features three main sections, each with a 'FREE' badge and a 'Why choose SAS' link:

- SAS® University Edition:** Teach or learn SAS skills using SAS foundational technologies. Available for STUDENT, EDUCATOR, RESEARCH, and LEARNER. Includes a screenshot of the SAS Studio interface.
- SAS® OnDemand for Academics:** Access statistical analysis, data mining and forecasting software. Available for EDUCATOR. Includes a screenshot of the SAS OnDemand interface.
- NEW! SAS® Viya® for Learners:** Build data science skills with our cloud-enabled, open analytics engine. Available for EDUCATOR. Includes a screenshot of the SAS Viya interface.



# SAS University Edition & SAS OnDemand for Academics

	SAS® University Edition	SAS® OnDemand for Academics
<b>Runs</b>	Local computer or AWS	Cloud
<b>Products</b>		
Base SAS®	everyone	everyone
SAS/STAT®	everyone	everyone
SAS/IML®	everyone	everyone
SAS/ACCESS® to PC Files	everyone	everyone
SAS® Studio	everyone	everyone
SAS/GRAPH®		everyone
SAS/ETS®		everyone
SAS/OR®		everyone
SAS/QC®		everyone
SAS® Enterprise Guide®		For academic teaching
SAS® Enterprise Miner™		For academic teaching
SAS® Credit Scoring		For academic teaching
SAS® Text Miner		For academic teaching
SAS® Forecast Server		For academic teaching

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## Free Software Trials: SAS.com

The screenshot shows the SAS.com homepage. At the top, there is a navigation bar with the SAS logo and a 'Try SAS For Free' button highlighted with a red box. Below the navigation bar, the main content area features a large banner with the text 'DID YOU KNOW? You can experience the power of SAS® with free software trials.' and a 'Discover SAS' button. The bottom of the page has a blue footer with icons for AI, Cloud, IoT, Open, SAS Platform, and SAS Viya.

Free Software Trials | SAS

sas.com/en\_us/trials.html

SAS Trials Request Pricing

**Data Scientist**  
**EVENT STREAM PROCESSING**

FREE TRIAL

**SAS® Event Stream Processing on SAS® Analytics Cloud**

Quickly build streaming projects using real-time data and machine learning to gain immediate insights for accurate and timely decision making.

Launch free trial

**BUSINESS ANALYST**

FREE TRIAL

**SAS® Visual Analytics**

Give users of all skill levels the ability to visually explore data while using in-memory technologies for faster analytical computations and discoveries.

Launch free trial

**DATA ANALYST/STATISTICIAN**

FREE TRIAL

**SAS® Visual Statistics**

Empower statisticians, data scientists and business analysts to discover key insights by analyzing data, and interactively creating and refining descriptive and predictive models.

Launch free trial

**DATA ENGINEER**

**SCIENTIST/ENGINEER**

**FORECASTING ANALYST**

SAS Visual Analytics Free Trial | SAS

sas.com/en\_us/trials/software/visual-analytics/ep-form.html

## SAS® Visual Analytics on SAS® Viya®

Try it free for up to 14 days!\*

(\*with the option to extend if needed)

Experience firsthand the power and ease of creating reports and dashboards in SAS Visual Analytics running on SAS Viya. With self-service analytics, you can easily explore, quickly understand and get the most value from your data.

**About the Trial**

- There's nothing to download, a web browser is all you need (we recommend Google Chrome 64-bit for the best experience).
- Use your own data, or use our sample data and demo scripts.
- Share the trial environment with four of your colleagues.
- Help is readily available from videos, documentation and an online community.

Interested in other SAS® Viya® products?

During the trial period you'll have access to other SAS Viya products in addition to SAS Visual Analytics.

**Don't wait. Sign up today!**

First Name \*

Last Name \*

Email Address \*

Organization/Company \*

Job Title \*

Country/Region \*

United States ▼

State \*

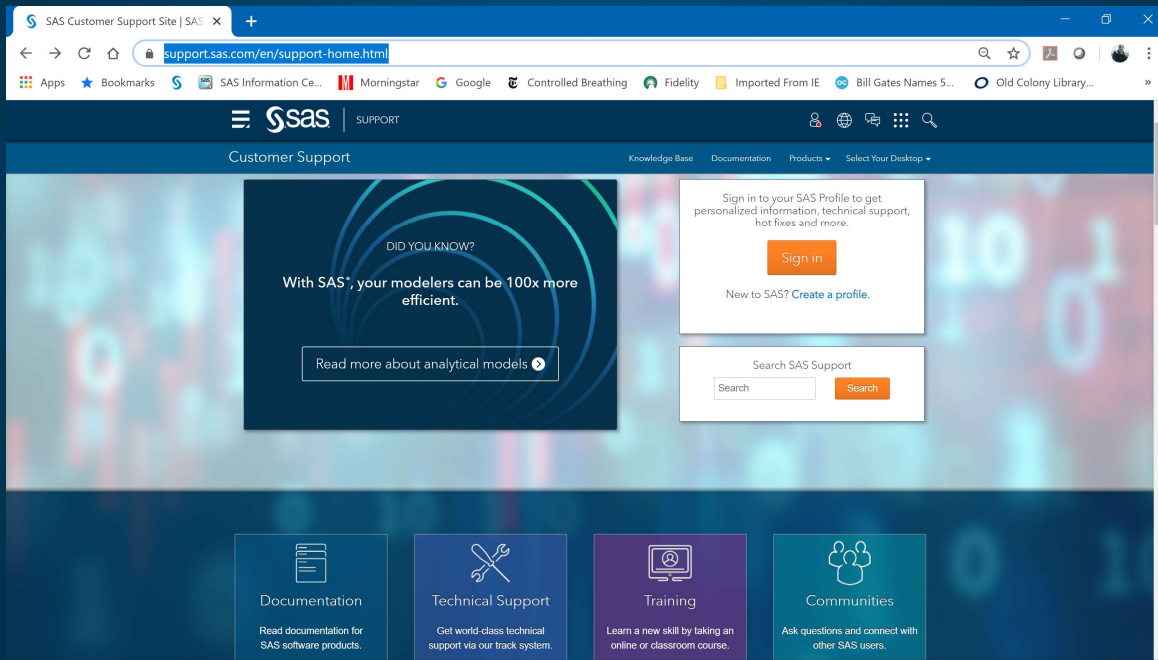
Please select ▼

Business Phone

All personal information will be handled in accordance with the SAS Privacy Statement.

Sign me up

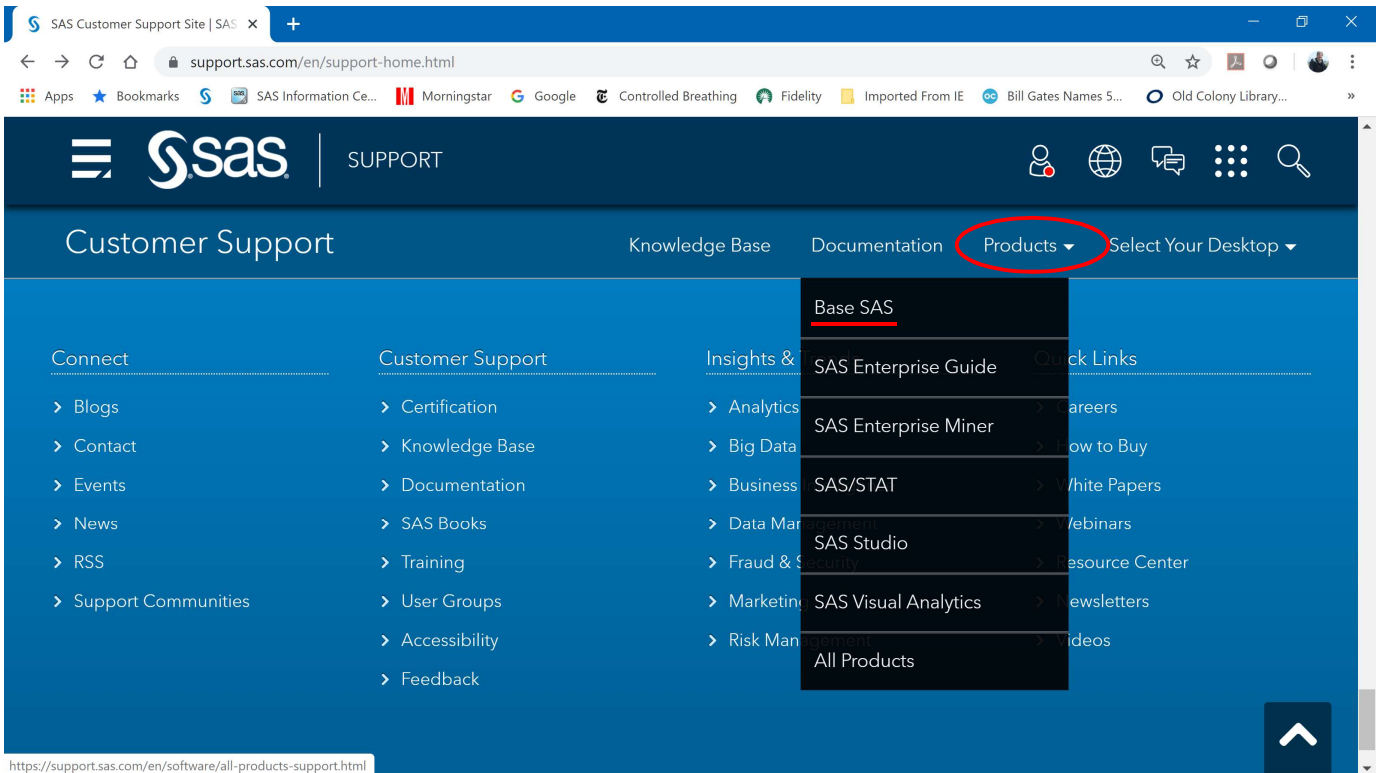
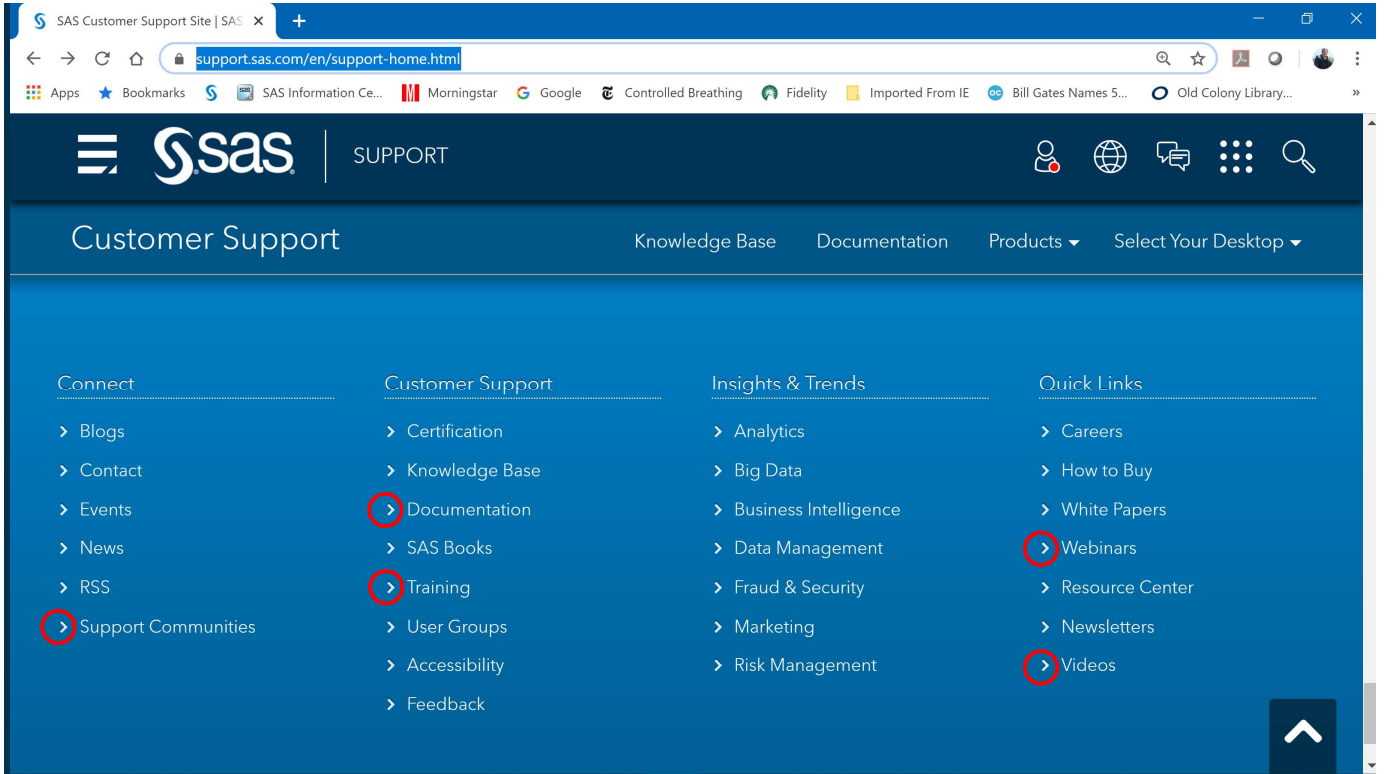
# support.SAS.com



## support.SAS.com

### Using the site

- A SAS profile is required to access some content
- SAS is improving the look and feel of its websites
  - Mix of web page formats: old look/new look
  - URLs of content will change
- Three ways to find content:
  - Search engine (Google)
  - Links at the top and bottom of many pages
  - Embedded links



Base SAS | SAS Support

support.sas.com/en/software/base-sas-support.html

SAS SUPPORT

Base SAS® Software

Overview Learn & Support

# Base SAS®

Providing a scalable, integrated software environment designed for data access, transformation, and reporting. It includes a fourth-generation programming language; ready-to-use programs for data manipulation, information storage and retrieval, descriptive statistics and report writing; an object-oriented language for advanced data manipulation (DS2); a federated query language (FedSQL); and a powerful macro facility that reduces programming time and maintenance issues.

- Learn
- Documentation
- Support
  - Downloads
  - Hot Fixes
  - Installation Notes
  - Usage Notes
  - Problem Notes
  - Alert Notes
  - Blogs & Communities

The most recent releases are SAS 9.4M6 and SAS®

Base SAS | SAS Support

support.sas.com/en/software/base-sas-support.html

SAS SUPPORT

Base SAS® Software

Overview Learn & Support

# Base SAS®

Providing a scalable, integrated software environment designed for data access, transformation, and reporting. It includes a fourth-generation programming language; ready-to-use programs for data manipulation, information storage and retrieval, descriptive statistics and report writing; an object-oriented language for advanced data manipulation (DS2); a federated query language (FedSQL); and a powerful macro facility that reduces programming time and maintenance issues.

- Learn
- Documentation
  - Documentation
  - Support
  - Technical Papers



Base SAS | SAS Support

support.sas.com/en/software/base-sas-support.html#documentation

Base SAS\* Software Overview Learn & Support

## SAS 9.4 & SAS Viya 3.4

### SAS 9.4 and SAS Viya 3.4 Documentation

- [SAS 9.4 and SAS Viya 3.4 Programming Documentation](#)
- [An Introduction to SAS Viya 3.4 Programming](#)
- [SAS and SAS Viya Procedures](#)
- [SAS Language Elements](#)

### What's New

- [What's New in Base SAS 9.4: Details](#)
- [What's New in SAS 9.4](#)

### Accessibility

- [Base SAS 9.4: Accessibility Features](#)
- [Creating Accessible SAS 9.4 Output Using ODS and ODS Graphics](#)

### Operating Environment Specific Information

- [SAS 9.4 Companion for Windows](#)
- [SAS 9.4 Companion for UNIX Environments](#)
- [SAS 9.4 Companion for z/OS](#)

### Related Documentation

- [SAS Programming Glossary](#)
- [SAS Studio 4.4](#)
- [The documentation for SAS/SECURE is in Encryption in SAS 9.4.](#)
- [Documentation for Hadoop](#)
  - [The documentation for the SAS/ACCESS Interface to Hadoop is in SAS/ACCESS 9.4 for Relational Databases: Reference.](#)
  - [The FILENAME statement \(for the Hadoop access method\) is in SAS 9.4 Global Statements: Reference.](#)
  - [Support for Hadoop](#)
- [SAS 9.4 SQL Query Window User's Guide](#)

SAS Help Center: Programming

go.documentation.sas.com/?cdclid=pgmsascdc&cdcVersion=9.4\_3.4&docsetId=pgmsashome&docsetTarget=home.htm&locale=en

**sas** Customer Support | SAS Documentation

SAS® 9.4 and SAS® Viya® 3.4 Programming Documentation / DATA Step Statements Q PDF EPUB Feedback

- ▶ What's New
- ▶ Syntax Quick Links
- ▶ Data Access
- ▶ SAS Analytics 15.1
- ▶ Base SAS Procedures
- ▶ DATA Step Programming
  - ▶ DATA Step Programming for CAS
  - ▶ Data Set Options
  - ▶ Formats and Informats
  - ▶ Functions and CALL Routines
  - ▶ DATA Step Statements
  - ▶ National Language Support (NLS)
  - ▶ SAS Logging Facility
  - ▶ Base SAS Utilities
- ▶ Global Statements
- ▶ System Options

Version ▾

New to SAS Programming?

### Syntax - Quick Links

Procedures

- By Name
- By Product
- SAS Viya Procedures

CAS Actions

- Actions by Name
- Action Sets by Name
- Action Sets by Product

Language Elements

- All
- Functions
- CALL Routines
- Component Objects

### SAS Procedures

Base SAS

- Procedures Guide
- Statistical Procedures
- National Language Support
- ODS
- SQL
- PROC CDISC
- For Windows, UNIX, and z/OS

High Performance

- Base SAS
- SAS Text Miner
- SAS Enterprise Miner
- SAS Forecast Server

### DATA Step

- Data Set Options
- Formats
- Informats
- Functions and CALL Routines
- DATA Step Statements
- Component Objects
- National Language Support
- ODS Statements
- SAS Logging Facility
- DATA Step Debugger and Utility Macros
- For Windows, UNIX, and z/OS
- For SAS Cloud Analytic Services

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SAS Help Center: SAS® 9.4 DATA x

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**sas** Customer Support | SAS Documentation

SAS® 9.4 and SAS® Viya® 3.4 Programming Documentation / DATA Step Statements

PDF EPUB Feedback

- What's New
- Syntax Quick Links
- Data Access
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- Base SAS Procedures
- DATA Step Programming
  - DATA Step Programming for CAS
  - Data Set Options
  - Formats and Informats
  - Functions and CALL Routines
  - DATA Step Statements**
    - What's New in SAS 9.4 DATA Step Statements
    - About This Book
      - About SAS DATA Step Statements
      - Dictionary of SAS DATA Step Statements

Version

## SAS® 9.4 DATA Step Statements: Reference

What's New in SAS 9.4 DATA Step Statements

About This Book

- About SAS DATA Step Statements
- Dictionary of SAS DATA Step Statements

Recommended Reading

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**sas** Customer Support | SAS Documentation

SAS® 9.4 and SAS® Viya® 3.4 Programming Documentation / SAS Programming Documentation

PDF EPUB Feedback

- What's New
- Syntax Quick Links
- Data Access
- SAS Analytics 15.1
- Base SAS Procedures
- DATA Step Programming
- Global Statements
- System Options
- SAS Component Objects
- DS2 Programming
- FedSQL Programming
- Macro Language Reference
- Output and Graphics
- Operating Environments
- Moving and Accessing SAS Files
- In-Database Technology

**New to SAS Programming?**

- Syntax - Quick Links
- Procedures
  - By Name
  - By Product
  - SAS Viya Procedures
- CAS Actions
  - Actions by Name
  - Action Sets by Name
  - Action Sets by Product
- Language Elements
  - All
  - Functions
  - CALL Routines
  - Component Objects

- SAS Procedures
- Base SAS
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  - Statistical Procedures
  - National Language Support
  - ODS
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  - PROC CDISC
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  - SAS Text Miner
  - SAS Enterprise Miner
  - SAS Forecast Server

- DATA Step
  - Data Set Options
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  - SAS Logging Facility
  - DATA Step Debugger and Utility Macros
  - For Windows, UNIX, and z/OS
  - For SAS Cloud Analytic Services

English

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**sas** Customer Support | SAS Documentation

SAS® 9.4 and SAS® Viya® 3.4 Programming Documentation / Getting Started with the SAS Output Delivery System PDF EPUB Feedback

- What's New
- Syntax Quick Links
- Data Access
- SAS Analytics 15.1
- Base SAS Procedures
- DATA Step Programming
- Global Statements
- System Options
- SAS Component Objects
- DS2 Programming
- FedSQL Programming
- Macro Language Reference
- Output and Graphics
  - Accessible Output
  - Output Delivery System (ODS)
    - Getting Started with the SAS Output Delivery System

Version

- Get Started with SAS Programming Documentation
  - Step-by-Step Programming**
  - SAS Concepts
  - Getting Started with the Output Delivery System
  - Introduction to SAS Viya Programming
  - SAS Programming Glossary
- Learning Resources from SAS
  - SAS Programming Learning Center
  - Free SAS Training
  - SAS Users YouTube Channel
- Learning Resources from SAS Press
  - Getting Started Books
  - Programming Books

- SAS Communities
  - SAS Analytics Community
  - SAS Data Mining and Machine Learning Community
  - SAS Customer Support
  - All SAS Viya Documentation Versions
  - SAS Enterprise Guide 8.1
  - SAS Studio 3.8
  - SAS Studio 5.1
  - SAS Visual Analytics
- Creating Accessible Output Using ODS and ODS Graphics
  - Accessibility Features for Base SAS

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SAS Books | SAS Support x SAS Help Center: Step-by-Step P x +

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SAS® 9.4 and SAS® Viya® 3.4 Programming Documentation / Step-by-Step Programming with Base SAS PDF EPUB Feedback

- Learning SAS Programming
  - Get Started with SAS
  - SAS Programming Learning Center
  - Step-by-Step Programming with Base SAS
    - What's New in Step-by-Step Programming with Base SAS 9.4
    - Accessibility Features of Step-by-Step Programming with Base SAS 9.4
    - About This Book
      - Introduction to the SAS System
      - Getting Your Data into Shape
      - Basic Programming
      - Combining SAS Data Sets
      - Debugging SAS Programs
      - Producing Reports
      - Producing Plots and Charts
      - Designing Your Own Output

Version

## Step-by-Step Programming with Base SAS® 9.4, Second Edition

What's New in Step-by-Step Programming with Base SAS 9.4

Accessibility Features of Step-by-Step Programming with Base SAS 9.4

About This Book

- Part 1 Introduction to the SAS System
  - What is the SAS System?
  - Working with Output Defaults
- Part 2 Getting Your Data into Shape
  - Introduction to DATA Step Processing
  - Starting with Raw Data: The Basics
  - Starting with Raw Data: Beyond the Basics

English

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Base SAS | SAS Support

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Base SAS® Software Overview Learn & Support

# Base SAS®

Providing a scalable, integrated software environment designed for data access, transformation, and reporting. It includes a fourth-generation programming language; ready-to-use programs for data manipulation, information storage and retrieval, descriptive statistics and report writing; an object-oriented language for advanced data manipulation (DS2); a federated query language (FedSQL); and a powerful macro facility that reduces programming time and maintenance issues.

Learn

- Get Started
- Documentation
- Connect
- Videos & Tutorials
- Samples
- Training

Base SAS | SAS Support

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Base SAS® Software Overview Learn & Support

### Accessing Data: Understanding SAS Libraries and Importing Data

- Accessing Data in SAS Libraries (Video)
- Accessing a SAS Library
- Using Data Libraries
- LIBNAME Statement Syntax
- LIBNAME Statement Syntax for Relational Databases
- Overview: PROC IMPORT
- PROC IMPORT Statement Syntax
- Example: Importing a Comma-Delimited File with a CSV Extension
- Using the Import Data Utility in SAS Studio (Video)
- Creating a SAS Table from a CSV File (Video)

### Exploring and Validating Your Data Using SAS Procedures and Built-in Tasks

- Overview: PRINT Procedure
- About the List Data Task
- Overview: FREQ Procedure
- About the One-Way Frequencies Task
- The One-Way Frequencies Task in SAS Studio (Video)
- Overview: MEANS Procedure

### Analyzing and Reporting on Your Data

- Overview: FREQ Procedure
- Example: One Way Frequencies of Unit Sales
- Overview: MEANS Procedure
- Example: Summary Statistics of Unit Sales
- Overview: SGPLOT Procedure
- Example: Bar Chart
- Overview: CORR Procedure
- Example: Correlation Analysis of Cars Data
- Overview: REG Procedure
- Example: Regression Analysis on Student Data
- Overview: TIMEDATA Procedure
- Example: Time Series Exploration on Price Data

### Exporting and Presenting Your Data

- A Quick Start to Using ODS
- Creating Simple Reports
- Creating Customized Reports
- Overview: Export Procedure
- Example: Exporting a Subset of Observations to a CSV File



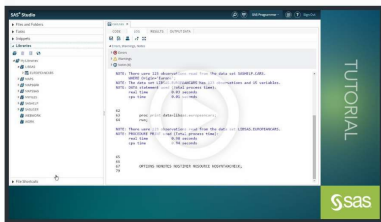
Base SAS | SAS Support

support.sas.com/en/software/base-sas-support.html

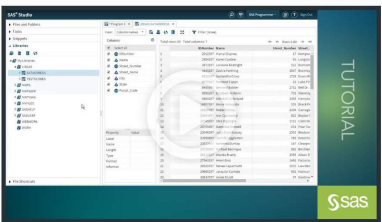
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Base SAS® Software Overview Learn & Support

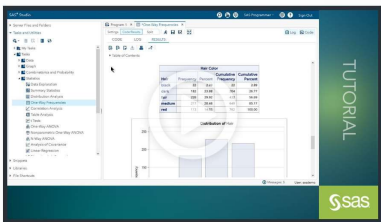
### More How-To Videos



Accessing Data in SAS Libraries



Merging SAS Tables in a Data Step



The One-Way Frequencies Task in SAS Studio

[View more videos](#) >

# video.sas.com

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Programming - SAS Video Portal

video.sas.com/category/videos/sas-visual-data-mining-and-machine-learning\_

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**SAS** VIDEO

Live Chat

- How To Tutorials
- SAS Add-In for Microsoft Office
- Administration & Architecture
- Advanced Analytics
- SAS Analytics U
- Customer Intelligence
- Data Management
- SAS Enterprise Guide
- SAS Enterprise Miner
- Fraud and Security Intelligence
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- SAS Visual Statistics

Integrating SAS Visual Data Mining and Machine Learning Models into SAS Enterprise Miner Projects

13:38

SAS Visual Data Mining and Machine Learning

Executing SAS Code in Pipelines

13:40

Getting Started with Data Mining and Machine Learning Pipelines on SAS® Viya®

5:57

Autotuning Gradient Boosting Models in Model Studio

8:02

Training Gradient Boosting Models in Model Studio

7:03

Training Gradient Boosting Models in Model Studio

6:51



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The Generalized Linear Models Task in SAS* Studio 7:50	The t Tests Task in SAS* Studio 6:41	The Binary Logistic Regression Task in SAS* Studio 7:55
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# youtube.com/sasusers - playlists

The screenshot shows the YouTube channel page for 'SAS Users', which has 2,11K subscribers. The 'PLAYLISTS' tab is selected, displaying several created playlists. The first row includes 'SAS Global Forum 2019: All-Access Pass', 'SAS Tips and Tricks', 'Getting Started with Internet of Things (IoT)', 'Getting Started with Machine Learning', 'Getting Started with Deep Learning', and 'Getting Started with Data Management'. The second row, under the heading 'Getting Started with SAS Products & Technology', includes 'Getting Started with SAS Enterprise Guide', 'Getting Started with SAS Studio', and 'Getting Started with SAS Add-in for Microsoft Office'. Each playlist thumbnail shows a video preview and the number of videos in the playlist.

# Google: SAS e-learning

The screenshot shows the SAS e-learning page on support.sas.com. The page is titled 'e-Learning' and features a list of courses with 'Start Now' buttons. A red box highlights the 'Free Tutorials' link in the left-hand navigation menu. The main content area lists several courses, including 'Free how-to SAS tutorials', 'SAS Programming 1', 'Statistics 1', 'SAS Programming for R Users', 'SAS Platform Administration: Getting Started', 'SAS Viya Enablement', 'Writing a Custom Task for SAS Studio', and 'Statistical Thinking for Industrial Problem Solving'. A 'NEW! SAS Learning Subscription' banner is visible on the right side of the page.

A screenshot of the Coursera website search results for the query 'sas'. The browser's address bar shows 'https://www.coursera.org/search?query=sas&'. The search results list several courses:

- Getting Started with SAS Programming** (SAS, COURSE, 4.9 (510), 14K students, Beginner)
- Statistics with SAS** (SAS, COURSE, 4.9 (29), 3.3K students, Intermediate)
- Doing More with SAS Programming** (SAS, COURSE, 4.8 (194), 3.1K students, Intermediate)
- Machine Learning Using SAS Viya** (SAS, COURSE, 4.7 (29), 2.3K students, Intermediate)
- Data Analysis and Interpretation** (Wesleyan University, SPECIALIZATION, 4.3 (1,008), 98K students)

A screenshot of the enrollment modal for the course 'Machine Learning Using SAS Viya'. The modal is titled 'Machine Learning Using SAS Viya' and offers three options:

- Purchase Course · \$49 USD
- Commit to earning a Certificate—it's a trusted, shareable way to showcase your new skills.
- Audit only  
You will have access to all course materials except graded items.

A 'Continue' button is located at the bottom of the modal. In the background, the course page is visible, showing the SAS logo, an 'Enroll for Free Starts Nov 18' button, and the text '2,295 already enrolled!'. A 'Frequently Asked Questions' section is also visible at the bottom of the page.



# Google: SAS Ask the Expert

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SAS experts will hold live events presenting a variety of topics.

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- [SAS Enterprise Guide: Getting Started](#)

Learn how to access SAS data, run tasks and change output format, manipulate data in the Query Builder window, and use the SAS Enterprise Guide programming
- [SAS Enterprise Guide: Hidden Gems](#)

This session looks at both new and existing functionality of SAS Enterprise Guide to help both novice users and longtime programmers.
- [SAS Enterprise Guide: Scheduling Projects](#)

In this webinar, you'll get a step-by-step guide to scheduling your SAS Enterprise Guide project using Windows Task Scheduler.
- [SAS Enterprise Guide: Tips, Tricks and Considerations for Programmers](#)

In this webinar, SAS programmers can discover tips, tricks and little-known functionalities in SAS Enterprise Guide

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DS2 1/2

- > **A Tour of SAS® Viya® Programming and Application Interfaces: A Forest Modeling Example**

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- > **Exploring SAS Stored Processes**

SAS Stored Processes provide the capability to define a SAS program that is managed and distributed via a server, but which can be executed from a variety of client applications
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> **Moving Your Programs to the World of DS2**

This session will introduce you to the SAS **DS2** programming language and show how you can accomplish this.
- > **PROC REPORT: Getting Started**

Join this session to learn basic syntax, ordering and grouping values, how to create new columns, and simple highlighting techniques.
- > **PROC REPORT: Next Steps**

Discover why you might need to use an alias when calculating multiple statistics for one analysis variable, or in using a variable for multiple

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Foreword by Sourabh Gupta

Today, powerful AI is augmenting analysis in every area, and helping to maximize the value of the analytic tools and solutions that SAS Press has been championing for the last 42 years.

We have carefully selected a handful of groundbreaking papers from recent SAS Global Forum papers which illustrate how SAS is adding capabilities to our tools and solutions that help customers build their own AI solutions, and examples of AI solutions using our tools.

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Foreword by Jared Dean

SAS Enterprise Miner was first released in 2006. The market has changed, and the capabilities have increased, but what remains the same is the potential. Enterprise Miner gives its users the answer to some of their most difficult predictive modeling challenges.

The papers included in this special collection have been selected to broaden your knowledge of Enterprise Miner, its utility and productivity.

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Foreword by Robert Allison

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SAS Base Programming for SAS®9 and SAS® 9.4 Syntax Reference Guide  
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**SAS LIBNAME Statement**  
LIBNAME *libref* *SAS-data-library* *<options>*;

**Browsing a SAS Library**  
PROC CONTENTS DATA=*libref* *\_ALL\_* *<NODS>*;  
RUN;

**Creating a SAS Data Set**  
PROC IMPORT DATAFILE=*"filename"* or TABLE=*"tablename"*  
OUT=*<libref.SAS-data-set>*  
<DBMS=*identifier*>  
<SAS-data-set-options>  
<REPLACE>;  
<GETNAMES= yes | no>;  
<GUESSINGROWS=*number-of-rows*>;  
<DATAROW= *row-number*>;  
RUN;

**Reading a SAS Data Set**  
DATA *output-SAS-data-set(s)*;  
SET *input-SAS-data-set*;  
<...more SAS statements...>;  
RUN;

**Accessing Microsoft Excel Data with the XLSX Engine**  
LIBNAME *<libref>*XLSX *<physical-path-and-filename.xlsx>* *<options>*;

**Selecting Variables – Data Set Options**  
(DROP=*variables*)  
(KEEP=*variables*)  
(RENAME=*old-variable-name=new-variable-name*)

**Subsetting Variables**  
DROP *variable(s)*;  
KEEP *variable(s)*;

**Conditional Processing**  
IF *expression* THEN *statement*;  
ELSE *statement*;

DO;  
SAS statements;  
END;

DO *index-variable=specification-1* <...*specification-n*>;  
...more SAS statements...  
END;

DO UNTIL(*expression*);  
...more SAS statements...  
END;

DO WHILE(*expression*);  
...more SAS statements...  
END;

**Operators in Expressions**

Operator	Meaning
= or eq	equal to
≠ or ne	not equal to
> or gt	greater than
< or lt	less than
>= or ge	greater than or equal to
<= or le	less than or equal to
and, both, or le	and, both. If both expressions are true, then the compound expression
AND or &	

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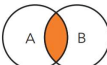
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## SQL Processing with SAS® Tip Sheet

This tip sheet is associated with the SAS® Certified Professional Prep Guide Advanced Programming Using SAS® 9.4. For more information, visit [www.sas.com/certify](http://www.sas.com/certify)


### Joins Summary

**Inner Join**




```
SELECT <list>
FROM table-A INNER JOIN table-B
ON A.Key=B.Key;
```

**Full Join**




```
SELECT <list>
FROM table-A FULL JOIN table-B
ON A.Key=B.Key;
```

**Right Join**



```
SELECT <list>
FROM table-A RIGHT JOIN table-B
ON A.Key=B.Key;
```


**Left Join**



```
SELECT <list>
FROM table-A LEFT JOIN table-B
ON A.Key=B.Key;
```


### Set Operators

The INTERSECT operator selects unique rows that are common to both tables.




```
SELECT <list>
FROM table-A INTERSECT
SELECT <list>
FROM table-B;
```

The EXCEPT operator selects unique rows from table A that are not found in table B.




```
SELECT <list>
FROM table-A EXCEPT
SELECT <list>
FROM table-B;
```

The UNION operator selects unique rows from both tables.



```
SELECT <list>
FROM table-A UNION
SELECT <list>
FROM table-B;
```

The OUTER UNION operator selects all rows from both tables.



```
SELECT <list>
```

Creating Macro Variables

# Google: SAS tip sheets

## support.sas.com/rnd/base/index.html

Base SAS | SAS Support

support.sas.com/rnd/base/index.html

SAS Abbreviations Are Your Friends; Use a Template Method to Code!

targets are updated and available for download.

### Tip Sheets

Here is the full list of Base SAS tip sheets (.pdf). The most recent ones are listed in the right-hand Hot Topics column. Print landscape on both sides of legal-sized (8.5 x 14 inches) paper.

- Graph Style
- Graph Template Language
- Graph Template Modification
- Hash object
- ODS
- ODS and CSS
- ODS DOCUMENT
- ODS EPUB
- ODS EXCEL
- ODS Excel XP Tagset
- ODS Graphics
- ODS LAYOUT
- ODS PDF
- ODS POWERPOINT
- ODS RTF
- ODS TAGSETS.RTF (SAS 9.2 & later)
- ODS WORD
- Perl regular expressions
- PROC ODSLIST, ODS TEXT
- PROC DATASETS
- PROC JSON
- PROC TEMPLATE tables
- PROC TEMPLATE styles
- Report Writing Interface
- Reporting PROCs styles
- XMLV2 engine

← Printable SAS Tip Sheets

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Hash Object Tip Sheet

support.sas.com/rnd/base/datastep/dot/hash-tip-sheet.pdf

## SAS9 – Hash Object Tip Sheet

### Hash Object – Methods

**declare hash obj();**  
**declare hash obj(dataset: 'dataset\_name',**  
**duplicate: 'replace' | 'error', hashexp: n,**  
**ordered: 'a' | 'd' | 'no', suminc: 'count\_var');**  
 Creates a hash object with the properties:  
**dataset:** loads the hash object from a data set.  
**duplicate:** controls how duplicate keys are handled when loading from a data set.  
**hashexp: n** declares 2<sup>n</sup> slots for the hash object.  
**ordered:** specifies a key sort order when using a hash iterator or the **output** method.  
**suminc:** *count\_var* contains the increment value for a key summary that is retrieved by the **sum** method.\*

**rc = obj.defineKey('key\_var1', ..., 'key\_varN');**  
**rc = obj.defineKey(all: 'yes');**  
 Defines a set of hash object keys given by *key\_var1...key\_varN*.

**rc = obj.defineData('data\_var1', ..., 'data\_varN');**  
**rc = obj.defineData(all: 'yes');**  
 Defines data, given by *data\_var1...data\_varN*, to be stored in the hash object.

**rc = obj.defineDone();**  
 Indicates that key and data definitions are complete.

**rc = obj.add();**  
**rc = obj.add(key: key\_val1, ..., key: key\_valN,**  
**data: data\_val1, ..., data: data\_valN);**  
 Adds the specified data associated with the given key to the hash object.

### Hash Object – Methods

**rc = obj.replace();**  
**rc = obj.replace(key: key\_val1, ..., key: key\_valN,**  
**data: data\_val1, ..., data: data\_valN);**  
 Replaces the data associated with the given key with new data as specified in *data\_val1...data\_valN*.

**rc = obj.check();**  
**rc = obj.check(key: key\_val1, ..., key: key\_valN);**  
 Checks whether the given key has been stored in the hash object. The data variables are not updated. Return codes are the same as for **find**.

**rc = obj.remove();**  
**rc = obj.remove(key: key\_val1, ..., key: key\_valN);**  
 Removes the data associated with the given key.

**rc = obj.clear();**  
 Removes all entries from a hash object without deleting the hash object.\*

**rc = obj.output(dataset: 'dataset\_name');**  
 Creates dataset *dataset\_name* which will contain the data in the hash object.

**rc = obj.sum(sum: sum\_var);**  
**rc = obj.sum(key: key\_val1, ..., key: key\_valN,**  
**sum: sum\_var);**  
 Gets the key summary for the given key and stores it in the DATA Step variable *sum\_var*. Key summaries are incremented when a key is accessed.\*

**rc = obj.ref();**  
**rc = obj.ref(key: key\_val1, ..., key: key\_valN);**

### Hash Object – Attributes

**i = obj.num\_items;**  
 Retrieves the number of elements in the hash object.

**sz = obj.item\_size;**  
 Obtains the item size, in bytes, for an item in the hash object.\*

**rc = obj.delete();**  
 Deletes the hash object.

### Hash Iterator – Methods

**declare hiter iterobj('hash\_obj');**  
 Creates a hash iterator to retrieve items from the hash object named *hash\_obj*.

**rc = iterobj.first();**  
 Copies the data for the first item in the hash object into the data variables for the hash object.

**rc = iterobj.last();**  
 Copies the data for the last item in the hash object into the data variables for the hash object.

**rc = iterobj.next();**  
 Copies the data for the next item in the hash object into the data variables for the hash object. A non-zero value is returned if the next item cannot be retrieved.

Use iteratively to traverse the hash object and return the data items in key order. If **first** has not been called, **next** begins with the first item.

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# SAS Jedi (Mark Jordan)

SAS Jedi, Author at SAS Blogs

blogs.sas.com/content/author/markjordan/

Working with Big Data in SAS®  
By Mark Jordan

Mastering the SAS DS2 Procedure  
Advanced Data-Wrangling Techniques  
Second Edition

Jedi SAS Tricks: The DSTODS2 Procedure (SAS9.4 MS)

Learn SAS | Programming Tips  
April 4, 2018  
Jedi SAS Tricks: Transwarp Processing with DS2 in SAS® Viya®  
When speed is required at scale, it's hard to beat parallel processing data in memory with DS2 and SAS® Viya® with the amazing Cloud Analytic Services (CAS)!

Data Management | Learn SAS | Programming Tips  
March 26, 2018  
Jedi SAS Tricks: The DSTODS2 Procedure  
You have the Infrastructure, and you know that DATA step would run so much better in DS2, but it's complicated and you don't know how to get started. Well, if you have SAS 9.4M5, rejoice! The DStoDS2

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## SAS Papers, Etc.

Susan J. Slaughter has made over 100 presentations at local, regional, and international SAS users group meetings. Her favorite papers (and associated stuff) are collected here. Click the title of an item to download it.

**SAS Essentials**

The SAS Essentials section of the Western Users of SAS Software conference was created

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**SAS Essentials**

The SAS Essentials section of the Western Users of SAS Software conference was created for people who are new to SAS. Each year this section includes three core presentations designed to give both a broad overview and a thorough grounding in the fundamentals of SAS. You can download my slides here:

How SAS Thinks: SAS Basics I

Introduction to DATA Step Programming: SAS Basics II

Introduction to SAS Procedures: SAS Basics III

**SAS Studio**

**SAS Studio: A New Way to Program in SAS** SAS Studio is an important new interface for SAS, designed primarily for programmers but with point-and-click features. SAS Studio is the interface for SAS University Edition and is the default for SAS OnDemand for Academics. This paper covers the fundamentals of writing SAS code using SAS Studio.

**Supplemental Material for SAS Studio Users** This document is a supplement to *The Little SAS Book, Fifth Edition*. Since *The Little SAS Book* shows the traditional programming interface (the SAS windowing environment, also called Display Manager), we wrote this parallel document for people writing code in SAS Studio.

**Debugging SAS code**

**Errors, Warnings, and Notes (Oh My): A Practical Guide to Debugging SAS Programs** This is one of my favorite papers. The topic is serious, but we had fun writing it.

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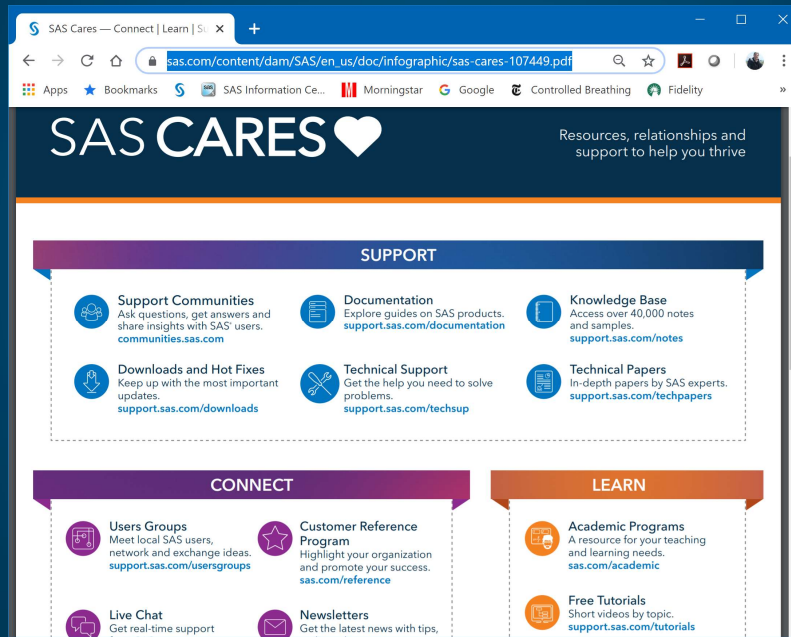
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Thanks to Lori Goldman & Elizabeth Axelrod from BASUG & Chris Hemedinger at SAS for suggestions on content

Thank you!