


BASUG Half-Day Training Announcement

The DATA step hash object can be used for a surprising variety of tasks, including table look-ups, joins, and aggregation. This course offers an introduction to the hash object, as well as examples of advanced hash techniques.

Please join us for this informative training, and consider coming to our morning quarterly meeting as well (separate event). *For information on the morning meeting, please visit [Quarterly Meeting Announcement](#)*

BASUG is hosting an informal light buffet lunch prior to the training. We hope you can join us for this opportunity to network and socialize with your fellow SAS users.

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| Topic | Cooking with the SAS Hash Object: From Basic Ingredients to Gourmet Entrées |
| Summary | A comprehensive overview of the hash object, including advanced hash techniques. Please see detailed topics below. |
| Instructors | <i>Paul Dorfman, Dorfman Consulting</i> <i>Don Henderson, Henderson Consulting Services LLC</i> |
| When | Thursday June 23, 2016 1:00 – 5:30 |
| Where | Microsoft New England Research and Development Center (NERD) ¹ One Memorial Drive Conference Center, First Floor Cambridge, MA 02142 857-453-6000  |
| Directions | Please visit the meeting site directions page |
| Price | \$155 - if paid online by June 13, 2016 \$180 - if paid online before by noon June 22, 2016 \$195 - at-the-door – check only Please see details below |
| Audience / Prerequisites | Intermediate and advanced level data step programmers; no hash experience is required. |
| Benefits | This course will provide you with a deep understanding of the workings and applications of the hash object. |
| How to register | Individual, on-line registration required. Pre-payment guarantees you a seat and handouts. Please visit the event registration page |
| Contact | If you have questions about the course, please contact the training coordinators at EventOrganizers@basug.org Quentin McMullen Jean Roth Brian Saper |

Course Description

Most programmers who use the SAS hash object, only use it to do table lookup. But it can do so much more! This class will be useful for both novice and experienced hash users who wish to more fully understand how the hash object works and what it can do for you.

Starting with the basics and progressing to some less-used features, this class will show how the SAS hash object really works in the DATA step and DS2 'kitchen'. The main emphasis will not be on amassing as many pieces of template code as possible, but rather on the fundamental things a hash object programmer must understand in order to use it in creative ways. The aim is not so much about tasting already cooked hash dishes (though there will be plenty of chances to do that, too), but about how to cook properly based on the fundamental properties of the ingredients and their interactions. The science of cooking is so much more than just following a recipe, and the same is true for programming with the hash object.

We'll discuss what the DATA step compiler sees when it encounters hash object references and what it must have seen - and done - to make the hash object work when its run-time turn comes. We'll see how the variables stored in the hash object talk to their host counterparts in the PDV*, and which hash methods make them affect each other and how.

While focusing on these underlying works, we'll learn many other indispensable things, including dealing with the memory management issues with large hash tables. We'll see that using the hash object for data aggregation can not only offer big savings in run time and memory footprint compared to other SAS techniques, but can also make certain tasks that were once unapproachable by other methods, now solvable.

One attending a cooking class can't help but notice how the chef uses the utensils. In terms of hash cooking, they are the methods, attributes, and syntax. We'll see the hash onions, potatoes, and tomatoes peeled, chopped, and sautéed in the SAS Program Editor kitchen, then tossed for proper tasting onto the SAS log - the perfect degustator of any SAS cooking. We'll have fun.

** What's the PDV? The Program Data Vector is a fundamental backbone of the data step! If you don't know about the PDV, make sure to attend our morning meeting, where you will learn all about it.*

Instructor Bios

Paul Dorfman
Dorfman Consulting



Paul began using SAS to compute some stuff pre-1990 while pursuing a degree in Physics. He went on to use it as a principal doing-whatever-with-data tool in a number of industries, such as telops, credit card/banking, pharma, and health insurance. In 1998, he introduced hashing into SAS programming and implemented all classic hash algorithms based on SAS arrays. After the advent of the canned hash object, he was first to have begun using it as a DATA step programming tool, then started propagandizing it and wrote the first SUGI user paper on the subject. Paul has invented a number of the hash object programming techniques (likely unintended by the SAS R&D), such as "summary-less" aggregation, array sorting, dynamic data set splitting, and hash memory footprint reduction by data portion disk off-loading and using the MD5 function.

Don Henderson
[Henderson Consulting Services LLC](#)



Don Henderson is the Owner and Principal of Henderson Consulting Services, a SAS Affiliate Partner. Don has used SAS software since 1975, designing and developing business applications with a focus on data warehouse, business intelligence, and analytic applications. Don was one of the primary architects in the initial development and release of SAS/IntrNet software in 1996, and he was one of the original developers for the SAS/IntrNet Application Dispatcher. Don has presented numerous papers at SUGI and regional SAS user group meetings, and continues to be a great supporter of SAS and its products.

Training Registration and Payment Instructions

Please read this ENTIRE section carefully!

1. *Pricing*
 - \$ 155 if paid online by June 13, 2016
 - \$ 180 if paid online before noon, June 22, 2016
 - \$ 195 if paid at-the-door (check only)

2. *Register*

INDIVIDUAL, ON-LINE REGISTRATION IS REQUIRED.

You *must register* for this training (even if you plan to pay by check). To register and purchase tickets for the class please visit the [event registration page](#).

Please register early! Seating and handouts are guaranteed only for pre-paid registrants.

3. *Payment Methods*

Credit Card: We urge you to pay by credit card, using our online system. Make sure to purchase your ticket by June 13, 2016 to get the early-bird price.

Check: **Do NOT mail a check to us prior to the workshop.** Pre-register online, and bring a check with you for the at-the-door-price.

Full payment is due by the day of the class. There will be NO EXCEPTIONS. We never accept cash. We *do* accept credit card payments through our online registration service.

4. *Refund Policy*

To receive a refund for the training, please send an email to [our training coordinators](#) by 5PM on June 13, 2016. After June 13, 2016, we will refund your payment (less a \$10 processing fee) only if we can fill your seat with other attendees.

BASUG Contacts

Mailing Address:

BASUG
PO Box 170253
Boston, MA 02117

Email the [BASUG Webmaster](#)

- (1) The Microsoft New England Research & Development Center (NERD) is a research and software innovation campus located in the heart of Cambridge, Massachusetts. The NERD vertical campus spans two buildings with its primary presence and conference center located at One Memorial Drive and a recently renovated and expanded space located at One Cambridge Center. NERD is home to some of Microsoft's most strategic teams including Microsoft Research New England, Microsoft Application Virtualization (App-V), SharePoint Workspace, Microsoft Technical Computing, Microsoft Advertising, Microsoft Lync, Microsoft Office 365 and more. NERD has become a hub of activity for the local tech community and has hosted more than 500 events and welcomed more than 40,000 visitors during the past two years.