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So Many Date Formats: Which Should You Use?

Kamlesh Patel, Jigar Patel, Dilip Patel, Vaishali Patel
Rang Technologies Inc, Piscataway, NJ

ABSTRACT

Nearly all data is associated with some Date information. In many industries, a SAS® programmer comes across various Date formats in data that can be of numeric or character type. An industry like pharmaceuticals requires that dates be shown in ISO 8601 formats due to industry standards. Many SAS programmers commonly use a limited number of Date formats (like YYMMDD10. or DATE9.) with workarounds using scans or substring SAS functions to process date-related data. Another challenge for a programmer can be the source data, which can include either Date-Time or only Date information. How should a programmer convert these dates to the target format? There are many existing Date formats (like E8601 series, B8601 series, and so on) and informats available to convert the source Date to the required Date efficiently. In addition, there are some useful functions that we can explore for deriving timing-related variables. For these methods to be effective, one can use simple tricks to remember those formats. This poster is targeted to those who have a basic understanding of SAS dates.

KEYWORDS

SAS, date, time, Date-Time, format, informat, ISO 8601, tips, Basic, Extended, Notation

APPLICATIONS:

SAS v9.2

INTRODUCTION

Date and time concept in SAS is very interesting and can be handled very efficiently if SAS programmers know beyond basics of different SAS Date formats and informats along with many different Date functions. There are various formats available to use as per need in SAS. However, many SAS programmers use very limited SAS formats to handle the Date or Date-Time variables for various conversions and manipulations of data. Hence, the purpose of this paper is to give some idea on exploiting power of various formats/informats and making programmers' day-to-day work more efficient.

As we know, commonly used formats are –

YYMMDD10. - > To get ISO 8601 Date format, YYYY-MM-DD

DATE9. - > To get readable Date format, DDMMMYYYY.

Before starting with other Date formats, lets refresh basic concepts of SAS Date-Time. SAS uses 01JAN1960 as reference Date for calculating all Date values. While working with Date formats in SAS, key things we need to understand is –

- SAS Internal Date and Date-Time value (Based on 01JAN1960):
 - Date Values: Number of days from 01JAN1960 would be SAS internal value for specific Date
 - Date-Time Values: Number of seconds from 01JAN1960 mid night would be SAS internal value for specific Date-Time value
- Concept of Formats:
 - By actual SAS Value, we can not interpret any specific value. So, we need to apply format to see it in meaningful way. How the Date will be displayed will be based on which format we are applying.
 - E.g. date9. format - > 0 Value will be display using DATE9. Format as 01JAN1960.

For each processing and operation, SAS uses SAS Internal value of Date and Date-Time. It is very important to understand in SAS that what is input or source data and what is expected output variable is.

- Input variable / Source data
 - What is source data whether it is a Date value or Date-Time value.
 - Using right formats, SAS will interpret accordingly based on source data.
- Output variable / Expected output
 - What we want at the end or as outcome variable. Is it Date or Date-Time or time or time adjusted with local time
- Meaning of same value in Date and Date-Time will be different
See in below examples-

```
*Code 1;
Data _Null_ ;
  A = 5; *Numeric Value;
  Put A E8601DA. ; *Date Format -- > So, it will read 5 as Date value i.e. 5 days
  from 06JAN1960;
  Put A E8601TM. ; *TIME Format -- > So, it will read 5 as Time value i.e. 5 Seconds
  from 01JAN1960-12:00:05 Mid night;
Run;
```

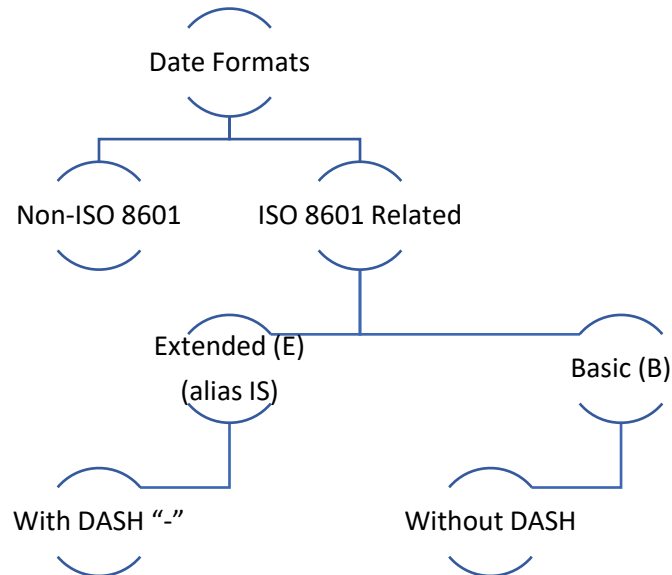
In SAS Log, you can see like in snapshot shown.

```
1960-01-06
00:00:05
NOTE: DATA statement used (Total process time):
      real time           4.11 seconds
      cpu time            0.07 seconds
```

So, the SAS internal value of Date cannot be directly used as Date-Time; otherwise, it will get you incorrect result.

CLASSIFICATION AND BREAK DOWN DATE FORMATS

For simplifications and based on focus of the paper, we have classified SAS formats in only 2 broad categories *here*.



For understanding ISO 8601 formats, following classification and explanation will be helpful.

- Notation:
Based on Notation, there are mainly 2 types of formats in ISO 8601 formats.
 - Basic - Without Dash
 - This Notations does not include dash (i.e. “-”) in the display of date. So, one of the example can be like this - 21JAN2012 will be displayed as 20120121.
 - Extended - With Dash
 - Extended notations will include dash (“-”) in between YY, MM, DD to separate them. So, one of the example can be like this - 21JAN2012 will be displayed as 2012-01-21.
- Understanding Formats:
 - 1st Part of Format
 - B - Basic Notation (without DASH “-”)
 - E or IS - Extended Notation (with DASH “-”)
 - 2nd Part of Format
 - 8601 - Follows format rules for ISO 8601 Format
 - 3rd Part + 4th Part of Format
 - At least Date is part of Input i.e. Date or Date-Time values as input

- D - Date Part Must be in input/output (i.e. DATE or DATE-TIME)
 - A - Date -> Date
 - N - Date-Time -> Date
 - T - Date-Time -> Date-Time
 - Z - Time with ZONE

Only Time is part of Input i.e. Time values as input

- T - Time value only as input. *So, output can only be Time.*
 - M - Time -> Time
 - Z - Time -> Time with ZONE
- L - Conversion to Local Time and write ZONE
 - Z - Convert to Local time and then writes Zone

One quick guide for you to refer –

If Input is-	If I want Output variable-	In Extended Notation	Use Format	Or Can be used (alias)-
Date	Date	Yes	E8601DAw.	IS8601DA
Datetime Value	Date	Yes	E8601DNw.	IS8601DN
Datetime Value	Date and Time	Yes	E8601DTw.d	IS8601DT
Datetime Value in UTC time.	Datetime Value in local time	Yes	E8601DXw.	IS8601DX
Datetime Value	Date and Time in zero meridian Coordinated Universal Date-Time (UTC) time	Yes	E8601DZw	IS8601DZ
Time value	Time value, Local time zone	Yes	E8601LZw.	IS8601LZ
Time values	Time value	Yes	E8601TMw.d	IS8601TM
Time values	Time value adjusted UTC	Yes	E8601TZw.d	IS8601TZ
Date	Date	No	B8601DAw.	
Datetime Value	Date	No	B8601DNw.	
Datetime Value	Date and Time	No	B8601DTw.d	
Datetime Value in UTC time.	Datetime Value in local time	No	B8601DXw.	
Datetime Value	Date and Time in zero meridian Coordinated Universal Date-Time (UTC) time	No	B8601DZw.	
Time value	Time value, Local time zone	No	B8601LZw.	
Time values	Time value	No	B8601TMw.d	

IMPORTANT TIPS TO REMEMBER

- If you are dealing with Date or Date-Time on variable, then, you can choose format with 3rd part as D.
- If you want time part of value to be displayed as ZONE, then 4th part should be Z.
- If you need to convert value to display in local time, then LZ
- If dealing with TIME on variable, then, you can choose format with 3rd part as T or L.
 - L -> If needed to convert to local.

OTHER NON-ISO 8601 FORMATS

There are many other important formats and informats in SAS like

- ANYDTDTE Informat
- ANYDTDTEw Informat
- ANYDTTMEw Informat
- ANYDXTDM Informat
- DTDATEx. Format
- DDMMYYxw. Format and many more...

In conclusion, SAS is equipped with so many formats and informats to handle different scenarios in dates manipulations. Programmers with good understanding of SAS formats and informats can exploit the power of SAS and handle various Date related variables very efficiently.

CONCLUSION

SAS has power to deal with various types of data manipulations. It is update to the SAS Programmer to explore the power of SAS. ISO 8601 Date and Time formats/informats are easy to understand and can be employed for making various data manipulations.

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CONTACT INFORMATION

Kamlesh Patel
Rang Technologies Inc, NJ
Kamlesh.Patel1@rangtech.com

Jigar Patel
Rang Technologies Inc, NJ
jpatel@rangtech.com

Dilip Patel
Rang Technologies Inc, NJ
dilip@rangtech.com

Vaishali Patel
Rang Technologies Inc, NJ
vaishali.sas01@gmail.com

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