• SAS Analytics U
• New Programming Language DS2
• Output Delivery System
• ODS GRAPHICS
WHAT IS DS2?

- Does not replace the DATA step language

- DATA step DNA is clearly visible
  - DATA and SET statements
  - IF...THEN...ELSE, DO loops
  - Expressions and Functions
  - Arrays

- But this is a new species of DATA step
  - No INFILE, INPUT, MERGE, UPDATE, MODIFY statements
  - Methods, Packages, and Scoping
WHAT IS DS2?

- DS2 is a new SAS programming language.
  - is included with Base SAS
  - has syntax that is similar to the Base SAS DATA step
  - provides advanced techniques for data manipulation

Base SAS DATA Step

```sas
data _null_;  
  Text='Hello, World!';  
  put Text=;  
run;
```

DS2 DATA Step

```sas
proc ds2;  
data _null_;  
  method init();  
    Text='Hello, World!';  
    put Text=;  
  end;  
enddata;  
run;  
quit;
```
WHY DS2

• Do SAS-y things in places SAS has never run before

• Modernized programming techniques and structures
  • Strict variable declaration (optional)
  • Variable scoping
  • Methods
    • Predefined (INIT, RUN, TERM)
    • User-defined
    • Variable encapsulation
  • Packages
    • Predefined (HASH, SQLSTMT, Logger, FCMP, …)
    • User-defined
WHAT IS NEW IN DS2?

- DS2 natively supports ANSI SQL data types for precise data manipulation.
- Examples:

<table>
<thead>
<tr>
<th>Data Type</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fractional Numerics</td>
<td>DECIMAL, DOUBLE, FLOAT, REAL</td>
</tr>
<tr>
<td>Integer Numerics</td>
<td>BIGINT, INTEGER, SMALLINT, TINYINT</td>
</tr>
<tr>
<td>Date and Time</td>
<td>DATE, TIME, TIMESTAMP</td>
</tr>
<tr>
<td>Character</td>
<td>CHAR, NCHAR, VARCHAR, NVARCHAR</td>
</tr>
</tbody>
</table>

SAS numeric variables are processed as DOUBLE. SAS character variables are processed as CHAR.
WHAT IS NEW IN DS2?

- The Base SAS DATA step processes each observation sequentially.
- DS2 can process observations in parallel.
WHAT IS NEW IN DS2?

With the SAS In-Database Code Accelerator, DS2 can also be executed in-database (Greenplum, Teradata, Oracle, …).
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• ODS LAYOUT is production with SAS9.4

• ODS LAYOUT ABSOLUTE
  • Only for printer destination
  • Full control over where to place output on the paper
  • Region may contain text, tables, graphics, images
• ODS LAYOUT GRIDDED
  • Supported with HTML, SASREPORT, PRINTER and POWERPOINT destination
  • you specify columns and rows
  • Column span and row span supported
  • Example has 2 columns and 4 rows

ods_layout_gridded
SG... PROCEDURES

- Proc SGPANEL
  - Supports many different plot types
  - Automatically creates panels based on class variables
THANKS FOR YOUR ATTENTION