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*Development on a Dime:  
Creating Your SAS®  
Programming Environment*

Presented by Michael Davis  
Health Market Science  
at the HASUG meeting  
held on May 14, 2010  
at BMS  
Wallingford, CT

HEALTH MARKET SCIENCE



**Presentation Overview**

- Many SAS® user group presentations focus on how to use SAS procedures and products to accomplish common programming and analysis tasks
- The benefits of creating a convenient and comfortable programming environment is often overlooked
- In 2007, the author found himself in a new organization where the workgroup procedures for using SAS were undefined
- Presentation goal is to help you create your own programming environment with minimum expenditure beyond SAS license costs.

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**Benefits of a Good Programming Environment**

- Replicate results quickly and accurately when data or specifications change
- Reduced opportunity for undetected errors
- Increased opportunity to share program models with colleagues
- Develop reputation as a “miracle worker”
- Less personal stress
- Example of programming environment...

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**Programming Environment Example**



Photo by Mitchell Chi

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**HMS SAS Computing Environment**

- Desktop computers running Windows XP with 4 GB memory and a RAID 0 disk array
- Recently acquired SAS software for a small Linux server to off-load long running jobs
- Desktop and Linux server are both running SAS Release 9.2 and share network storage
- Via CEDA, SAS files created on desktop and Linux can be shared without conversion
- Oracle® is primary database product, used for “heavy lifting” via PROC SQL pass-thru

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**Batch or Interactive SAS?**

- Interactive SAS to look at output datasets, testing, quick queries on SAS data sets
- Prefer batch SAS for substantial jobs
  - Easier to document and audit-trail individual programs and multiple job streams
  - Does not tie up foreground SAS session
  - Easier to rerun and clone jobs
  - Less likely to accidentally run SAS code
  - Use “SKIP” statement to exclude code from running

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### Example of "SKIP" Statement

```
%macro skip ;
<SAS statements to skip>
%mend ; /* skip */
```

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### SAS Code Editors

- SAS Enhanced Editor is a convenient color-coding editor
  - Need SAS session, Windows environment
- Many SAS-L posters swear by UltraEdit and TEXTPAD
- Freeware text editor PSPAD can be customized for SAS
- Comparison of text editors on [sasCommunity.org](http://sasCommunity.org)
- Author's choice: Notepad++, NEdit

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### Notepad++

- Free under GPL license
- Favorite features
  - Edit multiple files in same session
  - Find/Replace in files
  - Parenthesis highlighting
- Can be customized for SAS color-coding
  - Add UserDefineLang.xml to NotePad++ application data (Run => %appdata%)

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### UserDefineLang.xml (SAS files)

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### UserDefineLang.xml (LOG files)

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### Example: Color-Coding SAS Files

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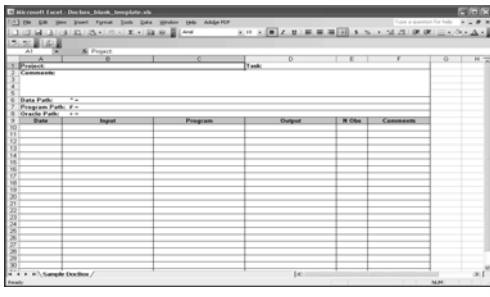
## Example: Color-Coding LOG Files

```

1  14  data golf_up ;
2  15  length
3  16  a 8 1
4  17  b 8 1
5  18  c 4 1
6  19  d 4 1
7  20  e 4 1
8  21  f 4 1
9  22  g 4 1
10 23  h 4 1
11 24  i 4 1
12 25  j 4 1
13 26  k 4 1
14 27  l 4 1
15 28  m 4 1
16 29  n 4 1
17 30  o 4 1
18 31  p 4 1
19 32  q 4 1
20 33  r 4 1
21 34  s 4 1
22 35  t 4 1
23 36  u 4 1
24 37  v 4 1
25 38  w 4 1
26 39  x 4 1
27 40  y 4 1
28 41  z 4 1
29 42  run ;
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### Example DocBox (spreadsheet)



The screenshot shows a spreadsheet with a table containing several rows of data. The columns are labeled 'Input', 'Program', 'Output', 'X File', and 'Comments'. The rows contain various alphanumeric values, likely representing data from a database or system logs.

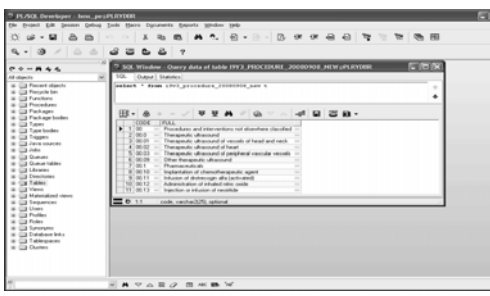
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### SAS and Oracle

- Let Oracle do the heavy lifting
  - If data is warehoused in Oracle, leave it there
  - Oracle server may have more processing power
- Prefer PROC SQL “pass-thru” to LIBNAME
  - Easier to move between Oracle tools and SAS
  - Easier to converse with the DBA
- Use PL/SQL Developer over SQL\*Plus
  - GUI environment but can edit queries
  - Explain Plan keeps DBA happy

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### Sample PL/SQL Developer Window



The screenshot shows the PL/SQL Developer interface. A central window displays a table with columns for 'TIME', 'TYPE', and 'TEXT'. The table contains several rows of data, including timestamps and text descriptions of events or transactions.

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### Oracle Tips

- To reduce the number of tables that need to be joined, query one of the larger table first, save the record IDs to an Oracle table in the same schema as a “driver” table, and use that table as a subquery in the WHERE clause
  - DBAs recommend this over remote DB links
  - Take advantage of indexed columns
- SQL\*Plus is more explicit than PL/SQL Developer or SAS Log in showing the location of errors in queries
- Always compute statistics when creating tables
  - Six minutes verses two hour example

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### A Little Unix Goes a Long Way

- Cygwin under Windows gives you the *head* and *tail* commands to view sample rows from huge text files
- Get your Unix administrator to set up *screen*. Screen is a terminal multiplexer. Among other features, screen can replace nohup for long-running background jobs.

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### CSV Splitter

- Useful for large received CSV files and you need to examine outside of SAS
- <http://www.fxfisherman.com/downloads/csv-splitter-1.1.zip>



The screenshot shows a small application window titled 'FXF fisherman's CSV Splitter v1.1 by Sepheap 1 y'. It has three input fields: 'CSV File' with a 'Browse File...' button, 'Number of Lines' with a numeric value of 50000, and 'Max Pieces' with a numeric value of 5. There are also 'Split Now!' and 'About' buttons.

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## Reference Links

- Axelrod, Elizabeth; *Boot Camp for Programmers: Stuff you need to know that's not in the manual*, [http://www.abtassociates.com/presentations/ena\\_2009.pdf](http://www.abtassociates.com/presentations/ena_2009.pdf)
- Free Software Foundation, *Screen*, <http://www.gnu.org/software/screen/manual/screen.pdf>
- Grant, Paul; *The "Skip" Statement*, <http://www2.sas.com/proceedings/sugi23/Coders/p76.pdf>
- IDM Computer Solutions; *UltraEdit*, <http://www.ultraedit.com/products/ultraedit.htm>

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## Reference Links (continued)

- Notepad++, <http://notepad-plus.sourceforge.net/uk/site.htm>
- PSpad on sasCommunity.org, [http://www.sascommunity.org/wiki/Tips\\_for\\_SAS\\_programming\\_with\\_PSPad](http://www.sascommunity.org/wiki/Tips_for_SAS_programming_with_PSPad)
- TEXTPAD, <http://www.textpad.com>
- Text Editor Comparison, [http://www.sascommunity.org/wiki/Text\\_Editors](http://www.sascommunity.org/wiki/Text_Editors)

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## Conclusion

- The degree of comfort in your programming environment is largely determined by tools and organization that you bring to your work
- Seek out colleagues in your organization that can contribute to your toolset
- Mentor others whenever they ask
- Please steal some of these ideas and make them your own

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- Oracle® is a registered trademark of Oracle Corporation and/or its affiliates
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