Debugging SAS Code

Jeff Simpson

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Why Debug Our Code?

The computer breaks things!

- Almost true!
- SAS syntax check is VERY forgiving but…
  - It doesn't know what we intended -
  - Only what we tell it!
- Resources may not be available
- We have to speak multiple languages
  - Datastep or is it (Data Step?)
  - DS2
  - Macro
  - SQL
  - DBMS
  - Regular Expressions

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But Honestly

We make mistakes!

- Semicolons
- Misspelled words
- Incorrect operators (+, -, *, /, **, \, AND, OR, =, <, >, (), etc)
- Unbalanced quotes

We often use SAS as a syntax checker

New products like Enterprise Guide 5.1 really help

- Wizards to build code without misspellings
- Reformat code

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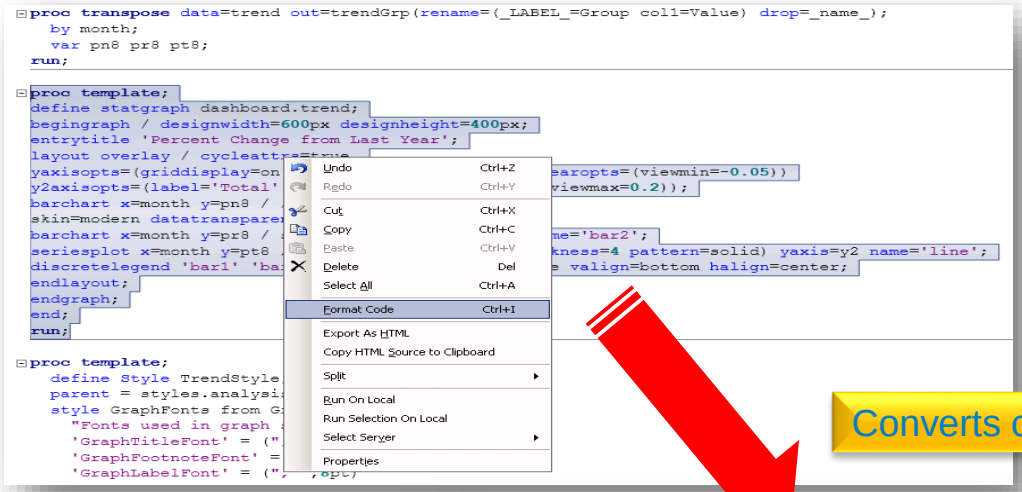
Enhanced Program Editor



Converts code into Indented Format

```
proc template;
    define statgraph dashboard.trend;
        begingraph / designwidth=600px designheight=400px;
            entrytitle 'Percent Change from Last Year';
            layout overlay / cycleattrs=true
                yaxisopts=(griddisplay=on label='Percent Change' linearopts=(viewmin=-0.05))
                y2axisopts=(label='Total' linearopts=(viewmin=-0.05 viewmax=0.2));
                barchart x=month y=pn8 / /* barlabel=true*/
                skin=modern datatransparency=0.3 name='bar1';
                barchart x=month y=pr8 / skin=modern barwidth=0.6 name='bar2';
                seriesplot x=month y=pt8 / lineattrs=graphData5(thickness=4 pattern=solid) yaxis=y2 name='line';
                discretelegend 'bar1' 'bar2' 'line' / location=inside valign=bottom halign=center;
            endlayout;
        endgraph;
    end;
run;
```

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- Reformat code
- Syntax suggestions

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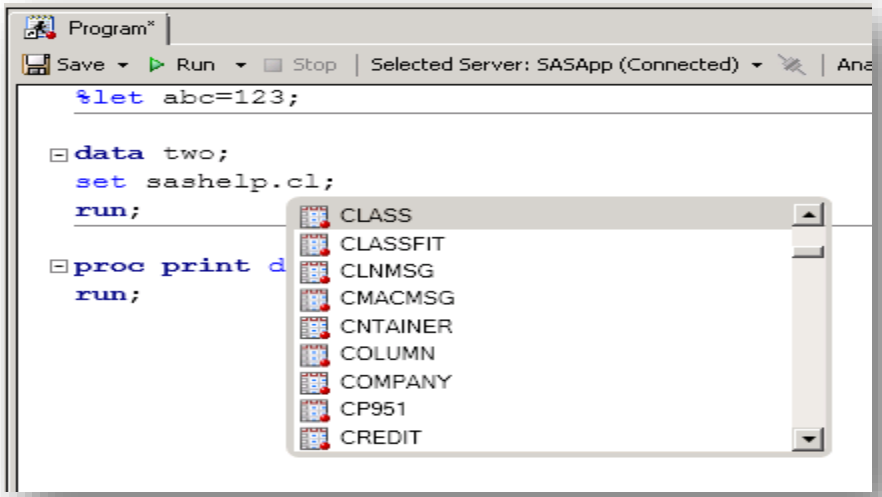
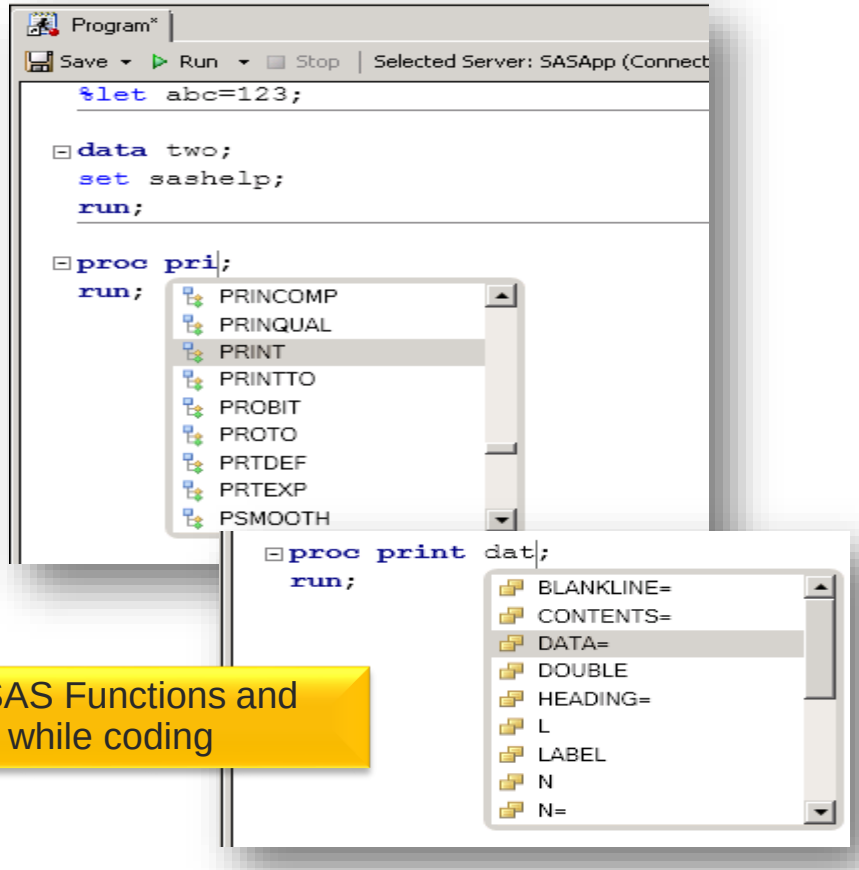
Enhanced Program Editor - Autocomplete



Connects to data library listing accessible data tables



Provides list of SAS PROCS, SAS Functions and Macro variables, assisting user while coding

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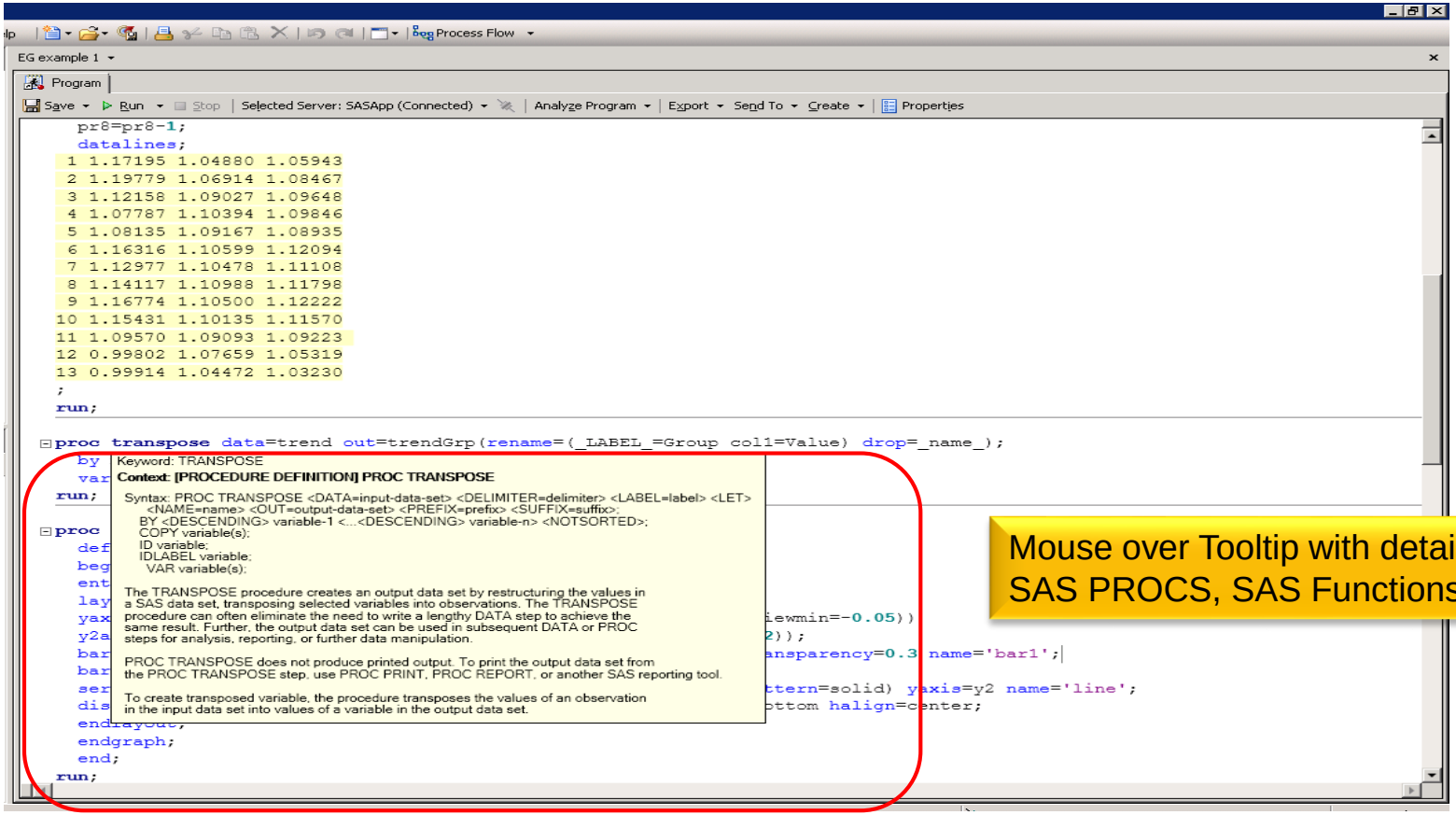
Enhanced Program Editor



Mouse over Tooltip with details for SAS PROCS, SAS Functions

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We often use SAS as a syntax checker

New products like Enterprise Guide 5.1 really help

- Wizards to build code without misspellings
- Reformat code
- Syntax suggestions
- Special highlighting of SAS syntax elements

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Debugging 101

Types of messages in the SAS log

- **NOTE:**
  - » Informational message telling us what each step has done
- **WARNING:**
  - » Something is amiss but not severe enough to cause SAS to stop executing
  - » ALWAYS need to check out why a WARNING: message was generated
- **ERROR:**
  - » “Houston, we have a problem”
  - » Something serious has occurred and SAS cannot continue processing

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Debugging 101

"I got an ERROR message, what do I do?"

- Start at the top
  - The first ERROR (or WARNING) usually causes others
  - Use Cntl-F to find the word ERROR
- Correct the problem
- Review other errors and correct any syntax problems
- What about logic issues?
- Rerun the code

"I don't understand what the message says!"

- Some messages seem cryptic
- Rule of thumb: If you don't understand the problem, look on the line above to see if there is a missing semicolon!!!

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New Statements in SAS 9.3

RESETLINE

- Restarts the program line numbering in the SAS log to 1

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Debugging 101

"What happens when I get an ERROR?"

- The current process ends
- The _ERROR_ variable is set to 1
- Sometimes SAS will go into syntax check mode
- Most often it will attempt to process any remaining steps
  - » Causes more ERRORs!

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Sample ERROR Messages

Easy to digest ERRORs

```
ERROR: File WORK.V_LMK_DETAIL.DATA does not exist.
```

- Check the spelling of the table
- Was the table created earlier in the process?

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Sample ERROR Messages

ERROR: Libname TRX is not assigned.

Did the LIBNAME statement fail?

Was there a LIBNAME statement?

Note: A good rule of thumb is to specify all Libname and Filename Statements at the beginning of your SAS program

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Sample ERROR Messages

```
ERROR: BY variables are not properly sorted on
       data set WORK.CHK_STATE.
```

This one is very obvious

Sort the table!

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Sorting Considerations

If the input data to be read by SAS is sorted already, then use the SORTEDBY data set option to assert a sort key.

- Follow this by a PROC SORT using the PRESORTED option for validation
- This sets the sort-verified flag on the SAS data set
- Some parts of SAS may choose to implement a sequence check regardless of the strength of the assertion

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Typical Syntax ERROR Messages

```
ERROR: Error in the LIBNAME statement.
14          libname "\\wil-sasprd03\basemarketing_backup\Phone_Sales\Front
      End\Business Basic Upsell\2010_7";
```

Looks generic but when you look at the associated LIBNAME statement:

- Missing libref

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Typical Syntax ERROR Messages

```
52        PROC CAPABILITY DATA = WORK.SORTTempTableSorted
ERROR: Procedure CAPABILITY not found.
53                  CIBASIC(TYPE=TWOSIDED ALPHA=0.05)
54                  MU0=0
```

Insure proper spelling

Use PROC SETINIT to see if the procedure is licensed in the SAS session

If licensed, was it installed?

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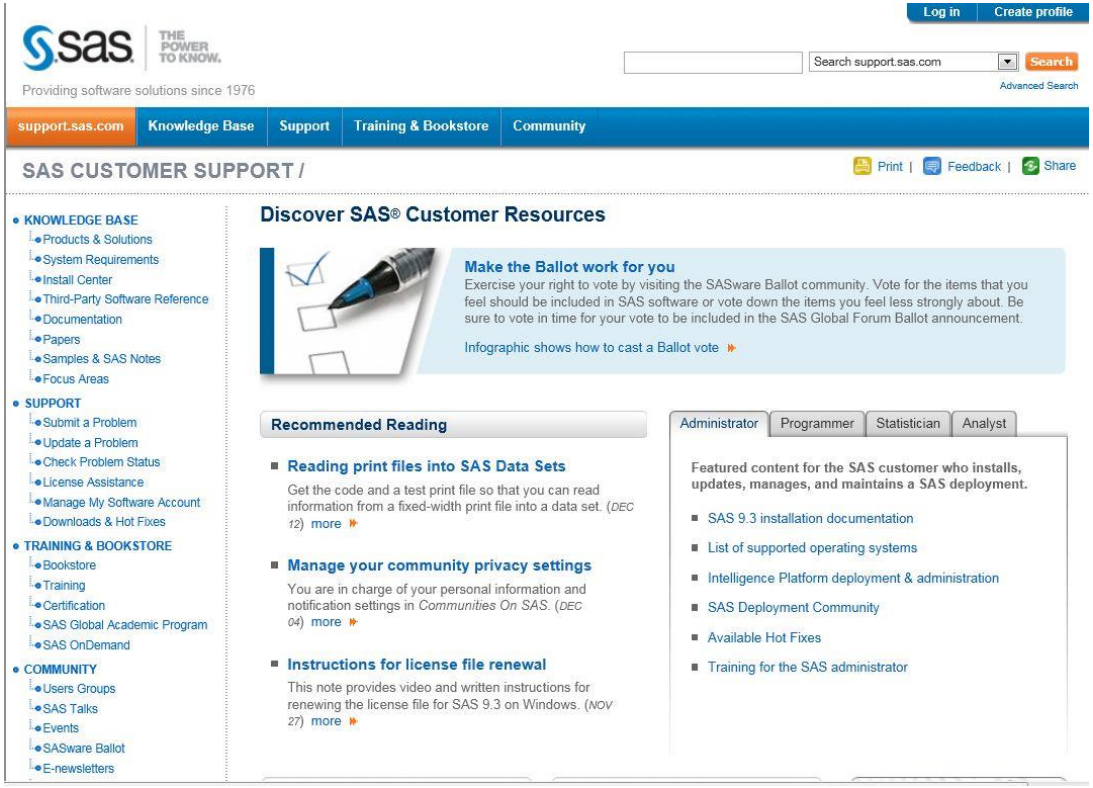
Typical Syntax ERROR Messages



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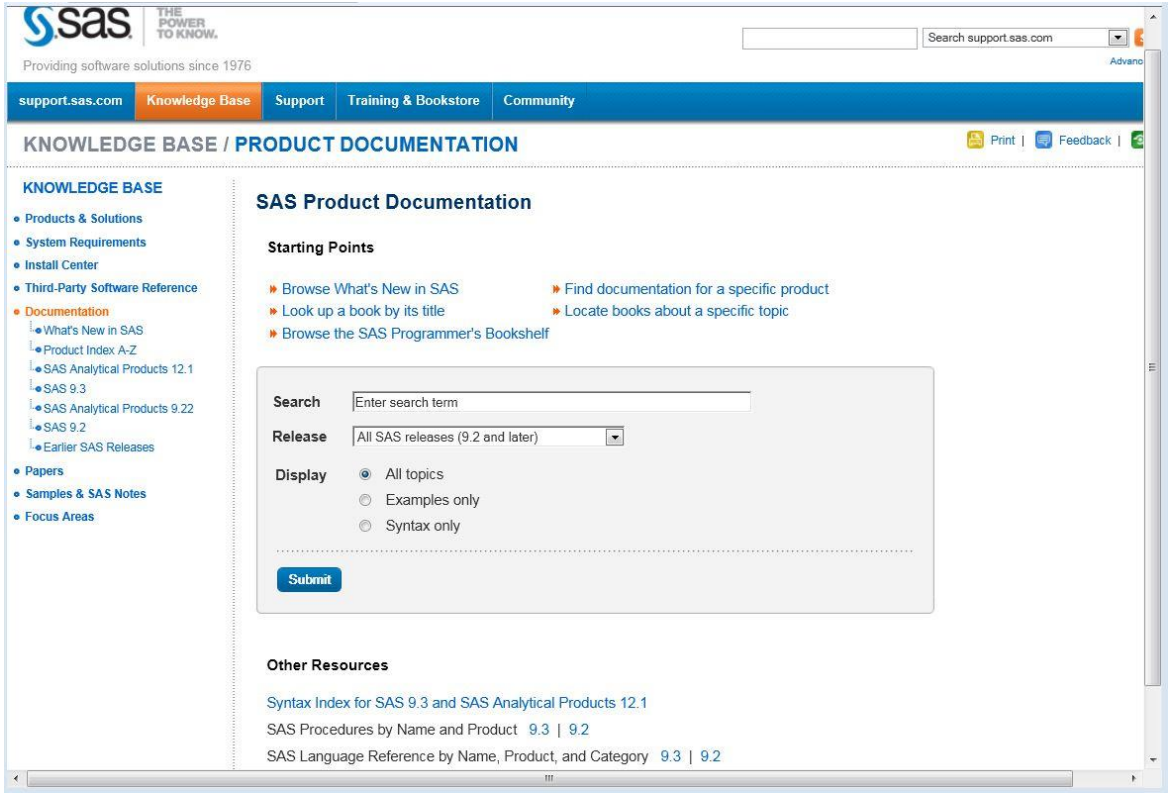

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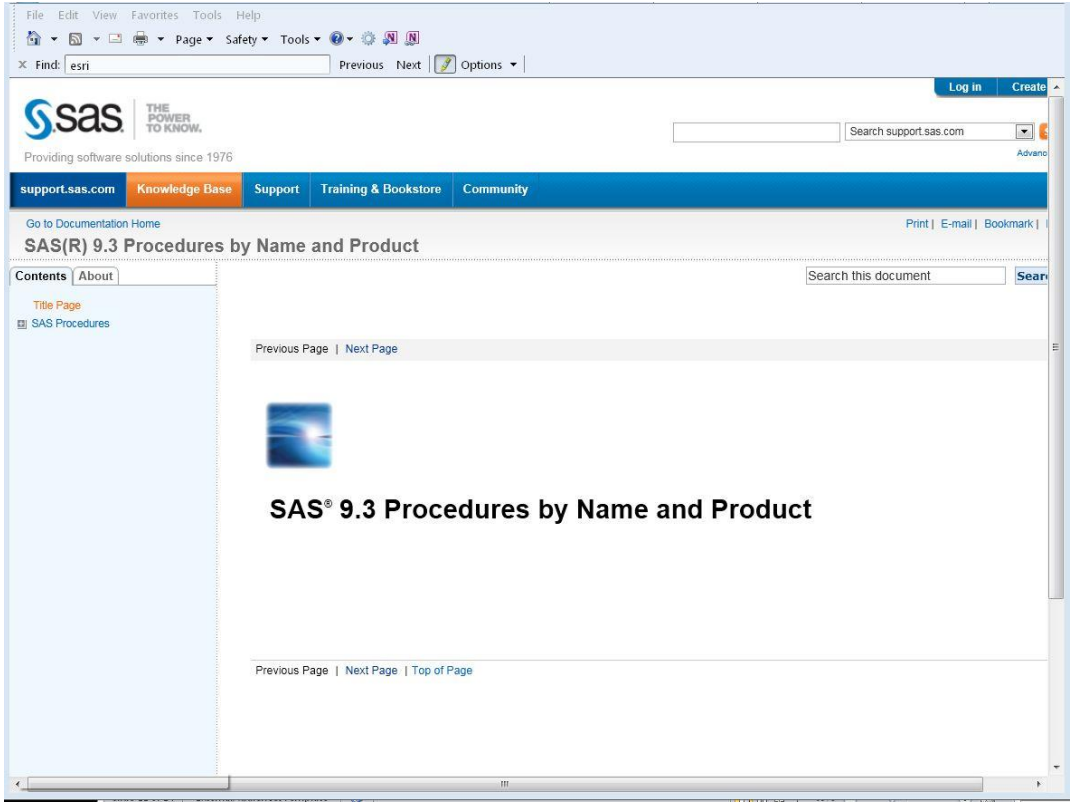
Typical Syntax ERROR Messages



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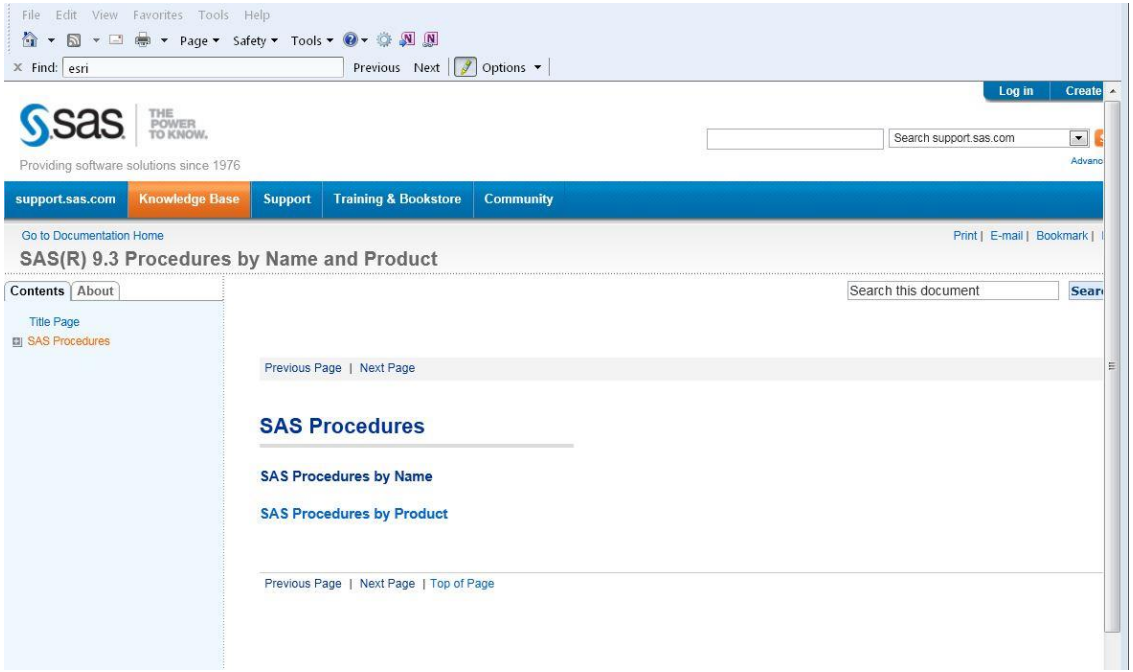
Typical Syntax ERROR Messages



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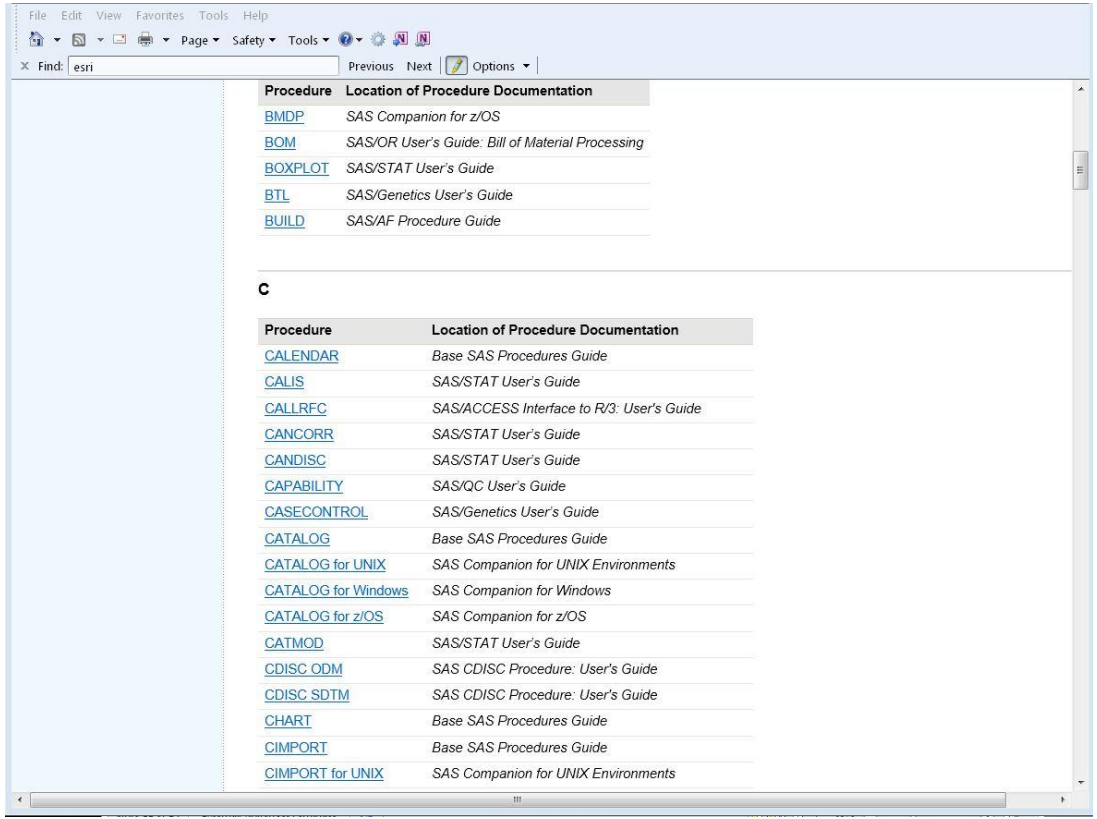
Typical Syntax ERROR Messages



Procedure	Location of Procedure Documentation
BMDP	*SAS Companion for z/OS*
BOM	*SAS/OR User's Guide: Bill of Material Processing*
BOXPLOT	*SAS/STAT User's Guide*
BTL	*SAS/Genetics User's Guide*
BUILD	*SAS/AF Procedure Guide*

C

Procedure	Location of Procedure Documentation
CALENDAR	*Base SAS Procedures Guide*
CALIS	*SAS/STAT User's Guide*
CALLRFC	*SAS/ACCESS Interface to R/3: User's Guide*
CANCORR	*SAS/STAT User's Guide*
CANDISC	*SAS/STAT User's Guide*
CAPABILITY	*SAS/QC User's Guide*
CASECONTROL	*SAS/Genetics User's Guide*
CATALOG	*Base SAS Procedures Guide*
CATALOG for UNIX	*SAS Companion for UNIX Environments*
CATALOG for Windows	*SAS Companion for Windows*
CATALOG for z/OS	*SAS Companion for z/OS*
CATMOD	*SAS/STAT User's Guide*
CDISC ODM	*SAS CDISC Procedure: User's Guide*
CDISC SDTM	*SAS CDISC Procedure: User's Guide*
CHART	*Base SAS Procedures Guide*
CIMPORT	*Base SAS Procedures Guide*
CIMPORT for UNIX	*SAS Companion for UNIX Environments*

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sas THE POWER TO KNOW.

Typical Syntax ERROR Messages

```
1    proc fomat cntlin=cntlin;
          -----
          14
ERROR: Procedure FORMAT not found.
WARNING 14-169: Assuming the symbol FORMAT was misspelled as fomat.
2    run;

NOTE: The SAS System stopped processing this step because of errors.
NOTE: PROCEDURE FOMAT used (Total process time):
      real time           0.04 seconds
      cpu time            0.00 seconds
```

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Other ERRORs

```
166         proc means data=nbp(where=(new_prdct_flag2>0) nway noprint;
                                                          ____         _
                                                          22           22
                                                                       79
ERROR 22-7: Invalid option name NWAY.
ERROR 22-322: Missing ')' parenthesis for data set option list
ERROR 79-322: Expecting a ).
167         class segment2 /*acct_bucket*/ nbp_flag;
ERROR: Variable new_prdct_flag2 is not on file WORK.NBP.
ERROR: No data set open to look up variables.
ERROR: No data set open to look up variables.
168         var  new_prdct_flag;
ERROR: No data set open to look up variables.
169         output out=overall_rates mean=add_rate;
170         run;

NOTE: The SAS System stopped processing this step because of errors.
WARNING: The data set WORK.OVERALL_RATES may be incomplete.  When this step
was
stopped there were 0 observations and 0 variables..
WARNING: Data set WORK.OVERALL_RATES was not replaced because this step was
stopped.
```

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Other ERRORs

ERROR: You cannot open WORK.TEST.DATA for output access with member-level control because WORK.TEST.DATA is in use by you in resource environment IOM ROOT COMP ENV.

- Usually seen with Enterprise Guide
  - Can appear with Base SAS (DMS)
- Close the table viewer for that table
- Use EG Option to automatically close all tables before submitting code

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Other ERRORs

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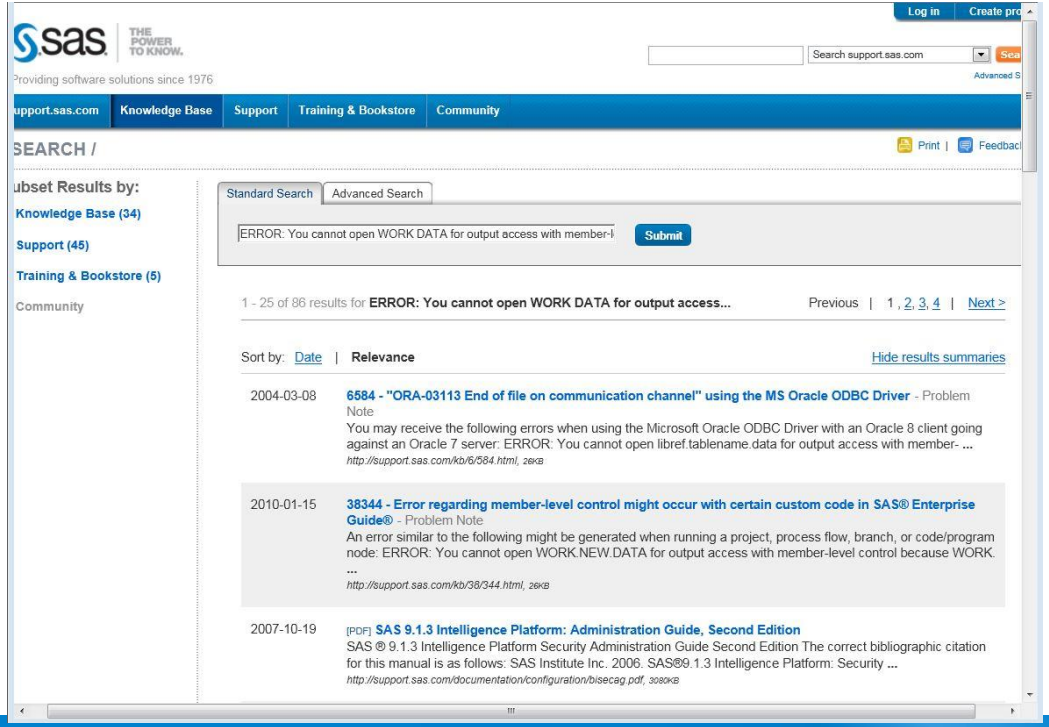

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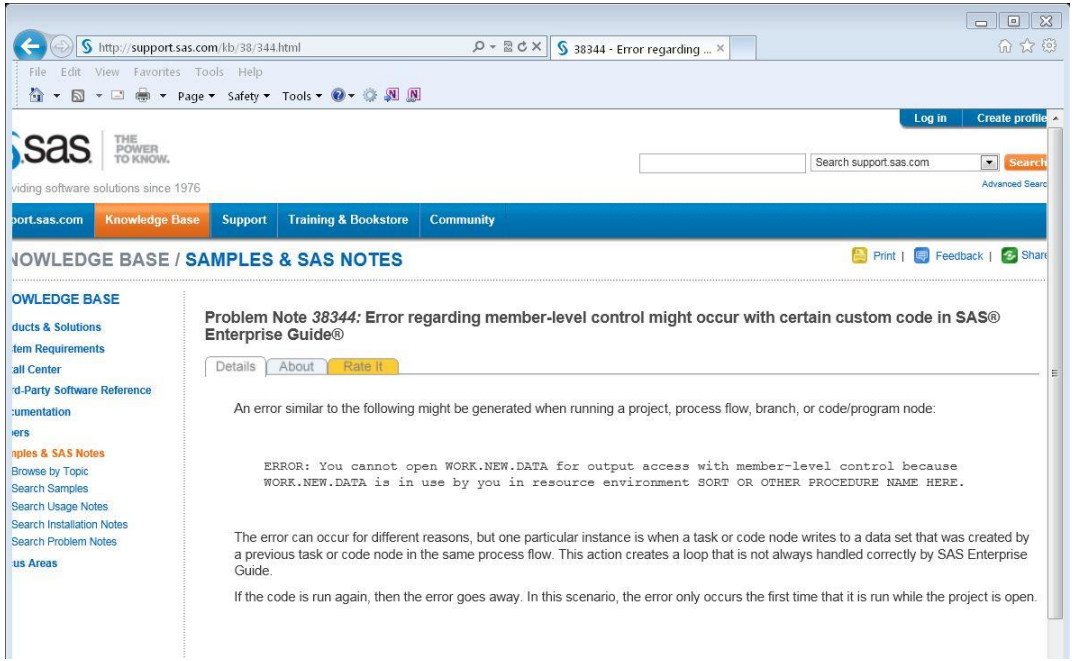

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Errors that aren't really ERRORs

```
NOTE: Invalid argument to function INPUT at line 295 column 167.
      ----+----1----+----2----+----3----+----4----+----5----+----6----+----7----+----8----+----9----+----0
32020 |1125364|10136927|BLN|CI_PERM|C&I PERMANET - MISC|C|05||FS|1351445.00|1367597.20|19990728|2042570|LE
 101  XINGTON/VA - COMME|N|BR|A||||N|Y|N|N|||20131228|2000000||.05875|N||1125364||19131ND|2042502|N||N|N|N
 201  || 202
```

```
_W_NumericValue = INPUT(_W_StringValue, COMMA32.);
```

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Are We Speaking the Same Language?

```
PROC SQL;
15              CREATE TABLE BRAND.FINAL_CL_LIST AS SELECT PHF.*,
16              ETH.A_ETHNY_ETHNIC_CODE,
17              CASE WHEN ETH.A_ETHNY_ETHNIC_CODE = 20 THEN Y ELSE " " END AS
HISP_HH_FLAG
18              FROM WORK.PHONE_FNL PHF
19              LEFT JOIN ETHN.ETHNIC ETH ON (PHF.CG_ID = ETH.CG_ID);
ERROR: Expression using equals (=) has components
    that are of different data types.
ERROR: The following columns were not found in
    the contributing tables: Y.
NOTE: PROC SQL set option NOEXEC and will
    continue to check the syntax of statements.
20      ;
21      QUIT;
NOTE: The SAS System stopped processing this step
```

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Common ERRORs Using PROC SQL

ERROR: Could not expand T1.*, correlation name not found.
ERROR: Unresolved reference to table/correlation name T1.
ERROR: The following columns were not found in the contributing tables: T1.

ERROR: The SUM summary function requires a numeric argument.
ERROR: The following columns were not found in the contributing tables:
RTL_CHKG_DPST_CNT.

ERROR: Table WORK.PHONE_CLEANUP doesn't have any columns. PROC SQL requires each of its tables to have at least 1 column.

ERROR: Column CG_ID could not be found in the table/view identified with the correlation name PHONE_CLEANUP.

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Common ERRORs Using PROC SQL

ERROR: The following columns were not found as CALCULATED references in the immediate query: CMRCL_BNDL_PRDCT_CNT.

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Debugging Macro Variables

```
%macro wrttxt(text=Something we really want to write to the log!);
%put text;
%mend wrttxt;
%wrttxt
```

Resolves to text

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Debugging Macro Variables

```
%macro wrttxt(text=Something we really want to write to the log!);
%put &txt;
%mend wrttxt;
%wrttxt
```

```
WARNING: Apparent symbolic reference TXT not resolved.
&txt
```

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Debugging Macro Variables

```
ERROR: Open code statement recursion detected.
27        %LET _CLIENTPROJECTNAME=;
WARNING: Apparent symbolic reference A not resolved.
WARNING: Apparent symbolic reference A not resolved.
ERROR: The text expression FIRST_NAME2='ANNE' AND
     LAST_NAME2='SHULER'";PROC
PRINT DATA=RESPONDERS2;WHERE &A.;VAR
     FIRST_NAME2 LAST_NAME2
STREET_ADDRESS CITY2 STATE2;RUN;PROC PRINT
     DATA=MAILFILE2;WHERE &A.;VAR
FIRST_NAME2 LAST_NAME2 STREET_ADDRESS
     CITY2 STATE2;RUN;;*';*" contains a recursive reference to the macro variable A.  The macro
variable will be assigned the null value.
```

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Macro Options

MPRINT|NOMPRINT

- Displays generated code in the SAS Log
- Default: NOMPRINT

MLOGIC|NOMLOGIC

- Displays execution of each macro statement
- Default: NOMLOGIC

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Macro Options

SYMBOLGEN|NOSYMBOLGEN

- Tells you what each Macro variable called by your program resolves to.
- Default: NOSYMBOLGEN

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New Macro Functions for 9.3

%SYSMACEXEC

- Indicates whether a macro is currently executing

%SYSMACEXIST

- Indicates whether macro is defined in WORK.SASMACR

%SYSMEXECDEPTH

- Returns the depth of macro nesting from the point of call

%SYSMEXECNAME

- Returns the name of the macro executing at a nesting level

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New Macro Statements

%SYSMACDELETE

- Deletes a macro definition from WORK.SASMACR

%SYSMSTORECLEAR

- Closes stored compiled macros and clears SASMSTORE=

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%SYSMSTORECLEAR

The code below produces the following errors:

ERROR: Unable to clear or re-assign the library MACTEST because it is still in use.

ERROR: Error in the LIBNAME statement.

```
libname mactest 'c:\atrash';
options mstored sasmstore=mactest;
%macro test1 / store;
    %put test1;
%mend;

libname mactest 'c:\newrpt';   /*mactest has not been closed so error
will  occur*/
options sasmstore=mactest;
%macro test2 / store;
       %put test2;
%mend;
```

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%SYSMSTORECLEAR

The following code processes correctly.

```
libname mactest 'c:\temp';
options mstored sasmstore=mactest;
%macro test1 / store;
      %put test1;
%mend;

%sysmstoreclear;

libname mactest 'c:\newrpt';
options sasmstore=mactest;
%macro test2 / store;
     %put test2;
%mend;
```

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Debugging Access to DB2

ERROR: CLI cursor fetch error: [IBM][CLI Driver] SQL1224N
The database manager is not able to accept new requests,
has terminated all requests in progress,
or has terminated your particular request due to an error or a force interrupt.
SQLSTATE=55032

Just Search the Web for it!

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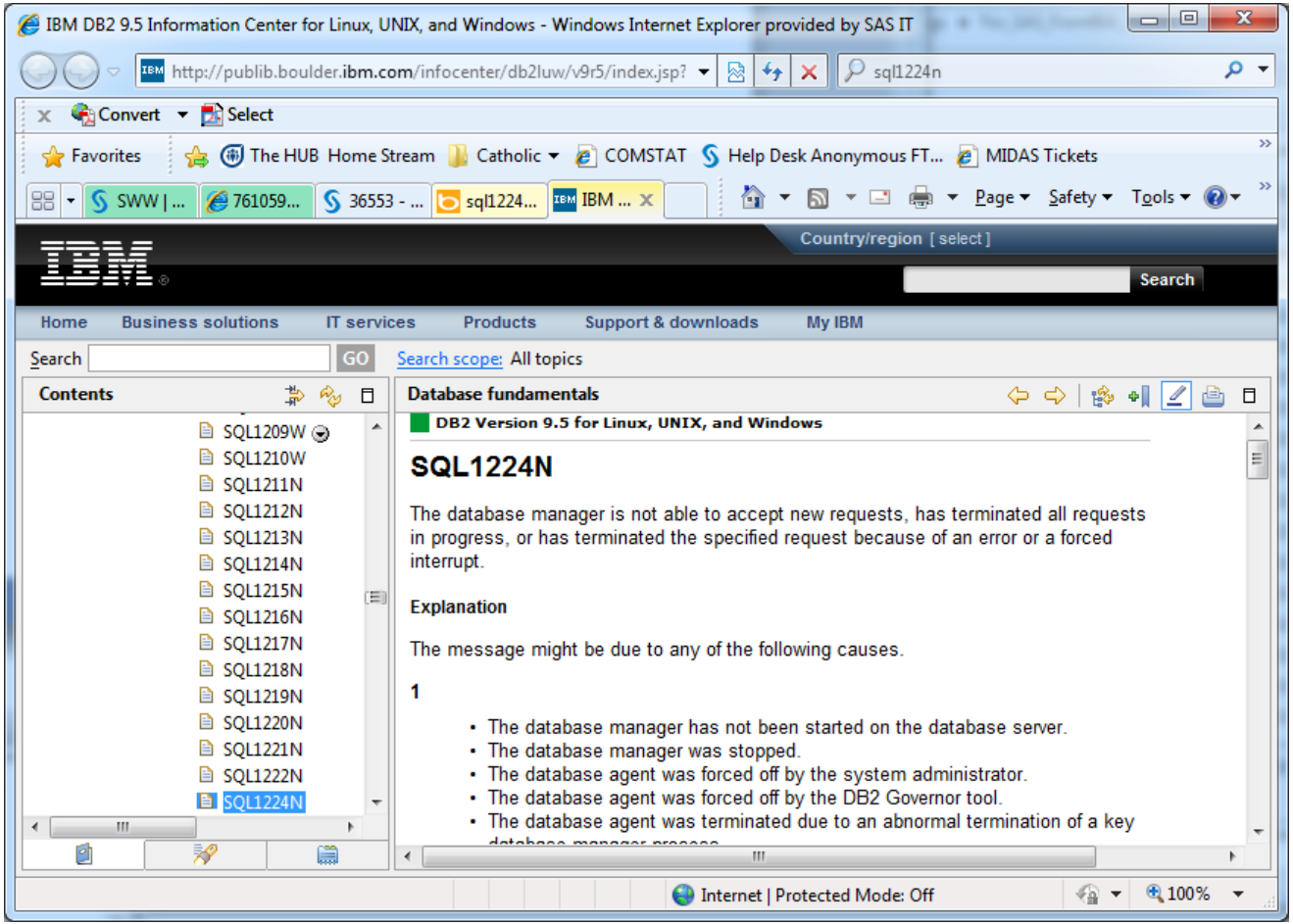

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Debugging Access to DB2

ERROR: CLI error trying to establish connection: [IBM][CLI Driver] SQL30082N Attempt to establish connection failed with security
reason "19" ("USERID DISABLED or RESTRICTED"). SQLSTATE=08001

DB2 Version 9.5 for Linux, UNIX, and Windows
SQL30082N
Security processing failed with reason *reason-code* (*reason-string*).
Explanation
An error occurred during security processing. The cause of the security error is described by the *reason-code* and corresponding *reason-string* value.
The following is a list of reason codes and corresponding reason strings:

19 (USERID DISABLED or RESTRICTED)
The userid has been disabled, or the userid has been restricted from accessing the operating environment at this time.

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Questions?

Jeff Simpson
Sr. Systems Engineer

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