

ADAPTIVE SAS PROGRAMMING FOR ADAPTIVE SUBMISSION NEEDS

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ADAPT

- ⦿ [verb (used with object)]
- ⦿ to make **sui**table to requirements or conditions; **adjust** or **modify** fittingly:

All the red words indicate it's all about **CHANGE**.

HOW ADAPTIVE A SUBMISSION TASK COULD BE.

- ◉ Just think FDA or other Stakeholders as restaurant critics trying foods in a newly opened restaurant. The chef keeps change recipes till all courses are served.



- ◉ There might be major/minor changes during the whole period of study but finally they are all comprised of minor changes.

COMMONLY SEEN CHANGES OR REQUESTS FROM STAKEHOLDERS.

- ◉ 1. Asking for unplanned BY-GROUP analysis. (by statistician, Clinician)
- ◉ 2. Datasets' structure/variable info updated (by DM or other programmers);
- ◉ 3. Some requests are in vague description like “drop all meddra terms from the output”.
- ◉ 4. It is not uncommon seen that some reviewers just need to add some new statistical numbers and insert into an existing TLF.
- ◉ 5. Some SAS innate hard-to-handle issues (e.g format incompatible, length truncation, identical variable names) when you want to optimize your code or apply reference code to a new study.

◎ The strategies

[你有连环马，我有勾连枪。
你有狼牙棒，我有天灵盖。]

SCENARIO 1. HOW TO VAGUELY SELECT VARIABLES

```
KEEP #("AGE*") #("*ID") ;
```

File Edit View Tools Run Solutions Window Help

✓

Explorer

Contents of 'SAS Environment'

Libraries File Shortcuts Favorite Folders

Computer

```
%AHGopendsn(adam.ads1);

data age_id;
  set adam.ads1;
  keep age :id ;
  rename id:=new_id;;
run;

/*-----*/

data age_id;
  %_(%str(

    set adam.ads1;
    keep #("age*") #("*id") ;

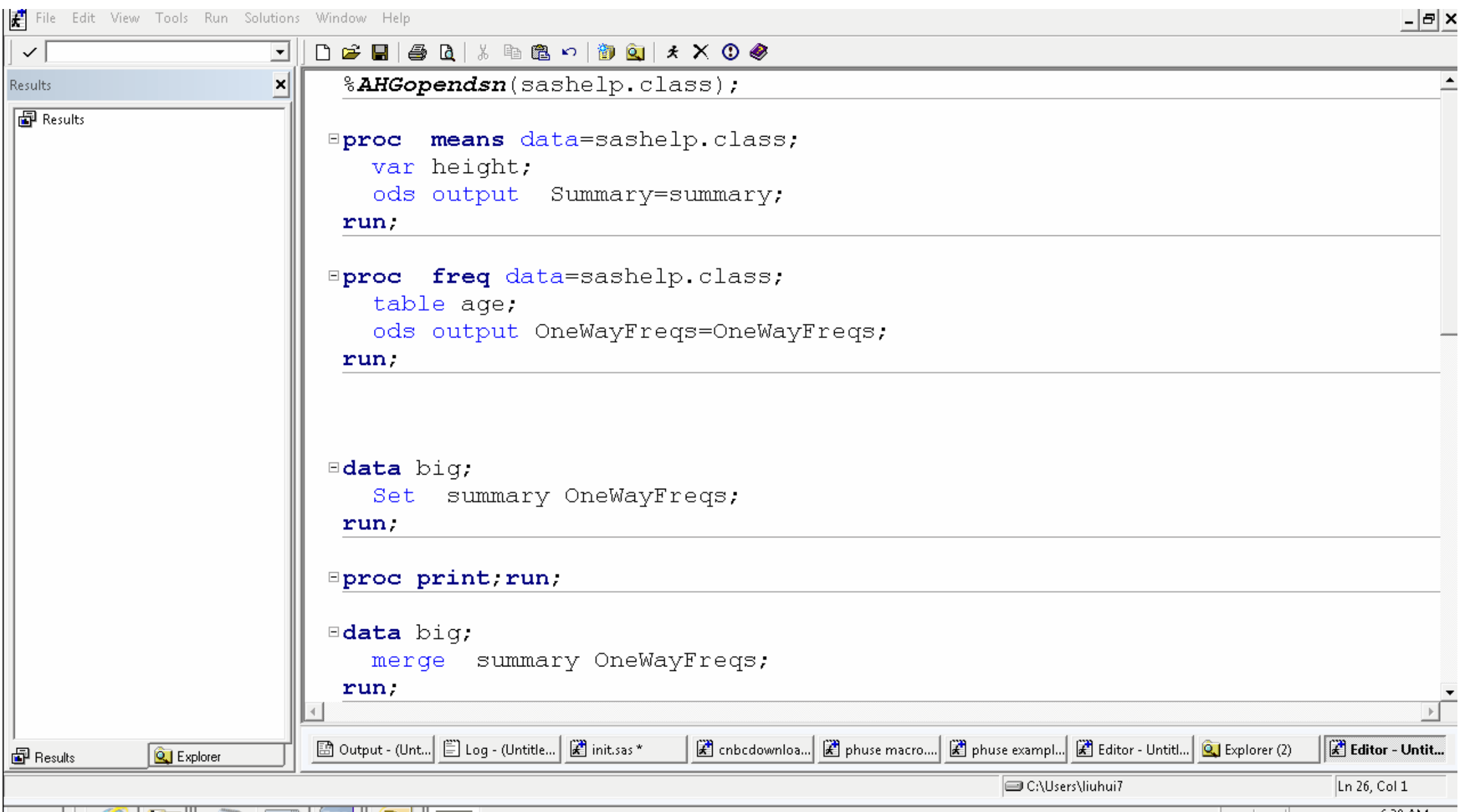
  ));
run;

%AHGopendsn(age_id);
/*-----*/
```

Output - (Untitled) Log - (Untitled) init.sas * cnbcdownload.s... phuse macro.sas phuse example.s... Editor - Untitle... Explorer (2)

C:\Users\liuhui7 Ln 23, Col 1

SCENARIO 2.
HOW TO FORCEFULLY MERGE
ARBITRARY DATASETS WHILE THEY
HAVE DIFFERENT STRUCTURES,
FORMATS, TYPES, CONFLICT NAMES.



SCENARIO 3. HOW TO SELECT
VARIABLES BY THE LENGTH OF
THEIR NAME? LIKE DROP ANY
VARIABLES LONGER THAN 8 (CDISC
LIMITS OF VARIABLE NAMES)

File Edit View Tools Run Solutions Window Help

Results

- Results
 - Means: The SAS System
 - Freq: The SAS System
 - Print: The SAS System
 - Print: The SAS System

```
%AHGopendsn(adam.adsl);  
/*-----*/  
  
data shortVar;  
  _(%str(  
    set adam.adsl;  
    drop $("/. {5} /");  
  ));  
run;  
  
%AHGopendsn();  
  
/*-----*/  
  
data LongVar;  
  _(%str(  
    set adam.adsl;  
    keep $("/. {5} /");  
  ));  
run;  
  
%AHGopendsn();
```

Output - (Unt... Log - (Untitle... init.sas phuse macro... phuse exampl... Editor - Untit... Explorer (2) Editor - Untit... Results Viewe...

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SCENARIO 4. TRY TO DO BY-GROUP
ANALYSIS WITH MACROS WHICH ARE
ABSENT OF BY OPTION OR
STANDARD MACROS YOU ARE NOT
ALLOWED TO MODIFY.

File Edit View Tools Run Solutions Window Help

✓

Explorer

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```
%macro complicatedMac(dsn,var);  
  %AHGprocMeans(&dsn,&var,out=stats,print=0,alpha=0.05  
  ,stats=n mean median min max /*n @ min '-' max*/  
  ,split=  
  ,orie=  
  ,labels=  
  ,left=left  
  );  
  
  data stats;  
    set stats;  
    drop _TEMA001;  
  run;  
  
  proc print;run;  
  %mend;  
  
  %complicatedMac(adam.adsl,age);  
  
  %_(by(adam.adsl ,sex ,%str(complicatedMac(adam.adsl,age))));  
  
  %_(by(adam.adsl ,trt01p ,%str(complicatedMac(adam.adsl,age))));
```

Results Explorer

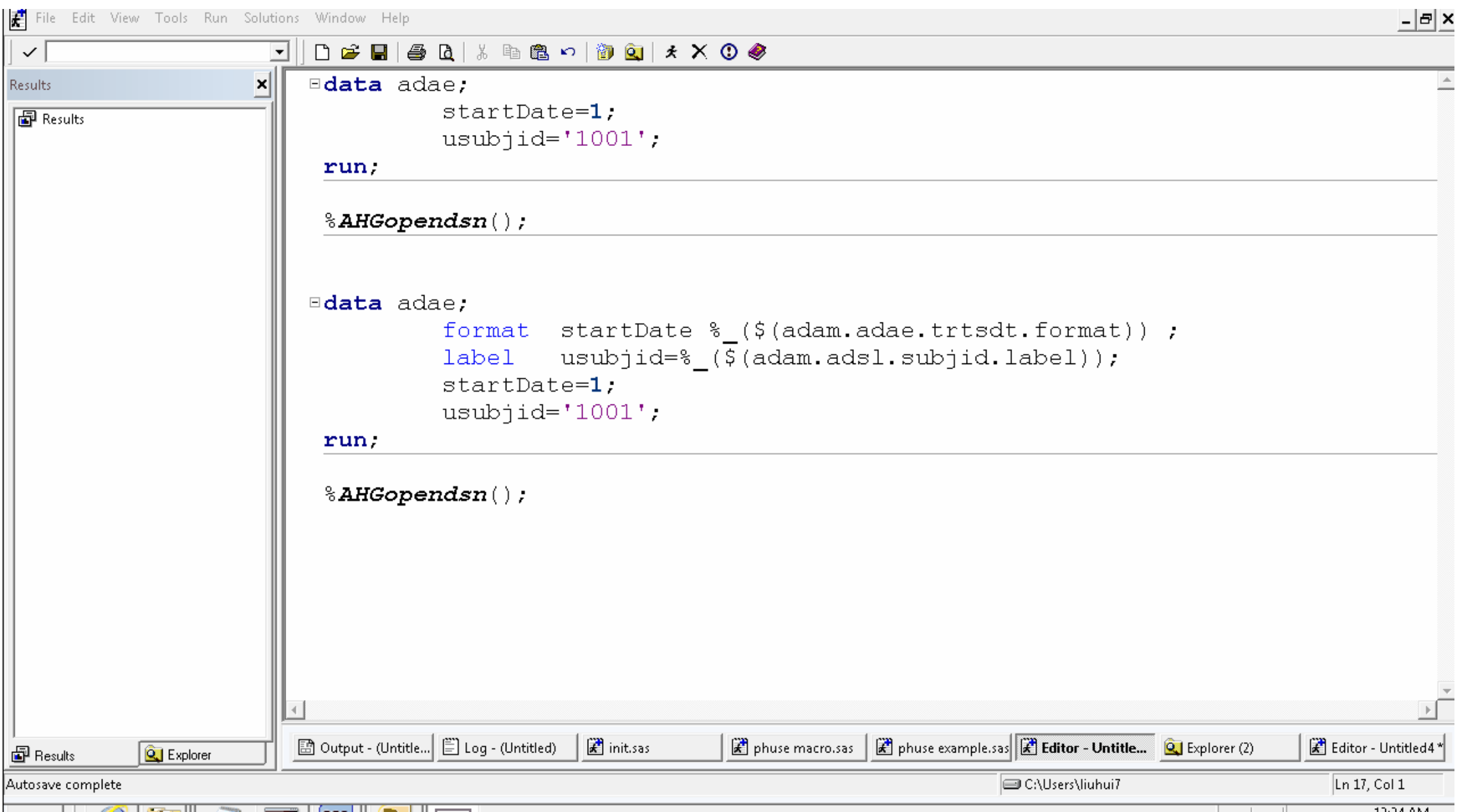
Output - (Untitled) Log - (Untitled) init.sas phuse macro.sas phuse example.sas * Editor - Untitled2 *

Autosave complete

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11:45 PM

SCENARIO 5. HOW TO STEAL FORMAT/LABEL/LENGTH FROM MULTIPLE DATASETS



- ◉ Why is this macro UNDERSCORE so omnipotent? It seems it is capable of anything. [Note: There is only ONE _ macro, you do not need to redefine each time since it will detect what you expect it to do automatically]
- ◉ It is because “ We are standing on the shoulders of giants ” what features other languages have we take. Whatever they grow we steal. I call it another version of “Winner takes all”.

HOW DO WE CONSTRUCT THIS INSANE MACRO?

- ◉ 1. Choose a good name for your macro. `_` is not interesting but short and non-distracting.
- ◉ 2. Make it accept arbitrary strings as parameter, not any fixed number of normal positional or keyword-style parameter.
- ◉ 3. Create a series of rules (features stolen from R, JQuery, regexp, object-oriented programming language)
- ◉ 4. Detect the pattern and decide which rule to apply.
- ◉ 5. Parse the key parameters and pass it to the REAL SAS code behind of them.
- ◉ 6. Enjoy the saved hours.

INNER MACRO “STEAL FORMAT/LABEL”

```
%macro AHGprop(dsn, var, prop);  
%local i tableid propvalue rc;  
%macro AHGeq(one, two);%upcase(&one) eq %upcase(&two)%mend;  
%if %sysfunc(exist(&dsn)) %then  
%do;  
%let tableid=%sysfunc(open(&dsn, i));  
%do i=1 %to %sysfunc(attrn(&tableid, nvars));  
%if %AHGeq(&var, %sysfunc(varname(&tableid, &i))) %then  
%do;  
%if %AHGeq(&prop, format) %then %let propvalue=%sysfunc(varfmt(&tableid, &i));  
%else %if %AHGeq(&prop, label) %then %let propvalue=%sysfunc(varlabel(&tableid, &i));  
%else %if %AHGeq(&prop, length) %then  
%do;  
%let propvalue=%sysfunc(varlength(&tableid, &i));  
%if %sysfunc(vartype(&tableid, &i))=C %then %let propvalue=$&propvalue;  
%end;  
%end;  
%end;  
%let rc=%sysfunc(close(&tableid));  
%end;  
%mend;  
%mend;
```

PART OF MACRO UNDERSCORE

```
▢ %macro _(str) ; %* #1 name ;  
  %if %sysfunc(prxmatch(m/^\s*\$\\((\w+\\. )?(\w+)\\. (\w+)\\. (\w+)\\)\s*$/i,%bquote(&str))) %then  
    %do; %* #2 #3 #4;  
    %local dsn var prop myprop;  
    %let dsn= %sysfunc(prxchange(s/^\s*\$\\((\w+\\. )?(\w+)\\. (\w+)\\. (\w+)\\)\s*$/\1\2/i,1,%bquote(&str))) ;  
    %let var= %sysfunc(prxchange(s/^\s*\$\\((\w+\\. )?(\w+)\\. (\w+)\\. (\w+)\\)\s*$/\3/i,1,%bquote(&str))) ;  
    %let prop=%sysfunc(prxchange(s/^\s*\$\\((\w+\\. )?(\w+)\\. (\w+)\\. (\w+)\\)\s*$/\4/i,1,%bquote(&str))) ;  
    %let myprop=%AHGprop(&dsn,&var,&prop) ; %* #5 #6;  
    &myprop  
  %end;  
%mend;
```

```
data ahuige;  
  format money %_($ (sashelp.cars.invoice.format));  
  Label size=%_($ (sashelp.cars.engineSize.label));  
  money=475;  
  size=999;  
run;  


---



```
proc print label;run;
```


```

Obs	money	Engine Size (L)
1	\$475	999

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