Introduction to SAS

For GREAT LAKES : PGP-BABI

By Preeti Pandhu

Founder & Director

DataScienceLab™

Know your trainer Preeti Pandhu

— 16+ years of experience
— Masters of Science: Statistics from University of Pune
— Cracked PHD entrance , attended 6 months compulsory course and did 6 months of research
— Research interest area: spatial data mining
— TOP three SAS certifications
— Worked as lecturer, business analyst, research, IP and analytical QA and trainer
— Worked with IDeaS a SAS company,SAS
— International trainer for SAS ,Pan India- R , analytics, SAS trainings
— Founder and director of DataScienceLab
— More than 70 trainings
— More than 750 participants ,338 international (covered since April 2014)
— Technical reviewed two books of US publication

Outline

- Getting started with SAS
- Accessing data in SAS
- Managing and manipulating data
- Data exploration , validation and analysis
- Data visualization

Getting started with SAS

Outline

- Introduction to Base SAS
- Programming basics
- Getting help from SAS help facility
- SAS Data structure
- Referencing storage-SAS Library

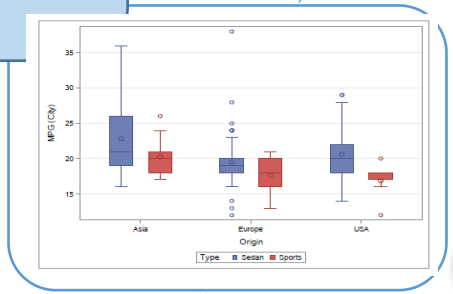
Introduction to Base SAS

Introduction to Base SAS

Access to virtually any data source such as DB2, Oracle, SYBASE, Teradata, SAP, and Microsoft Excel

Accessing

Report and create graphics



Visualization

DATA

Store data
Support for most widely used character encodings for globalization

Storing

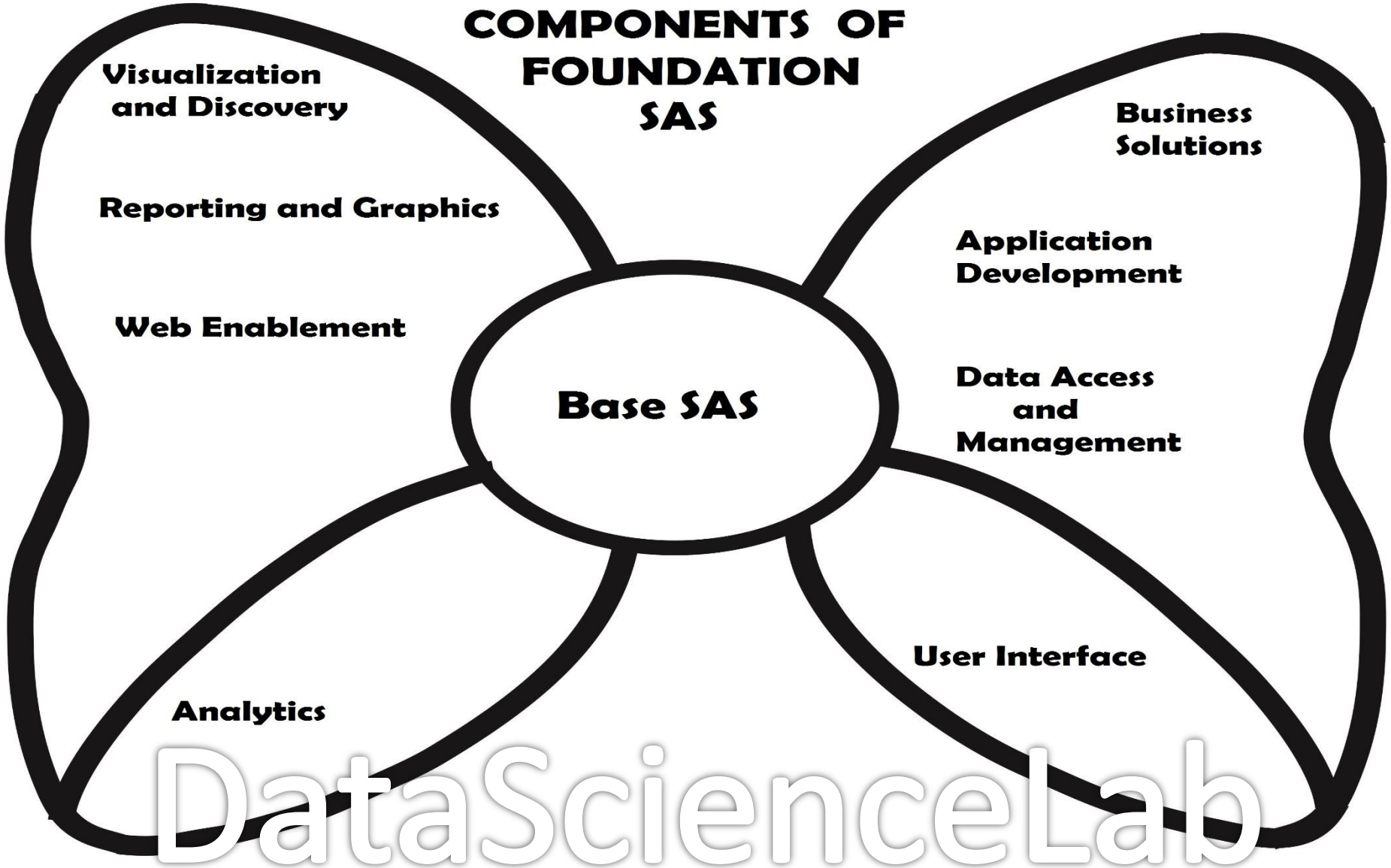
Analyze data using various procedures

Analysis

Transform and manage data

Manipulation & handling

Introduction to Base SAS



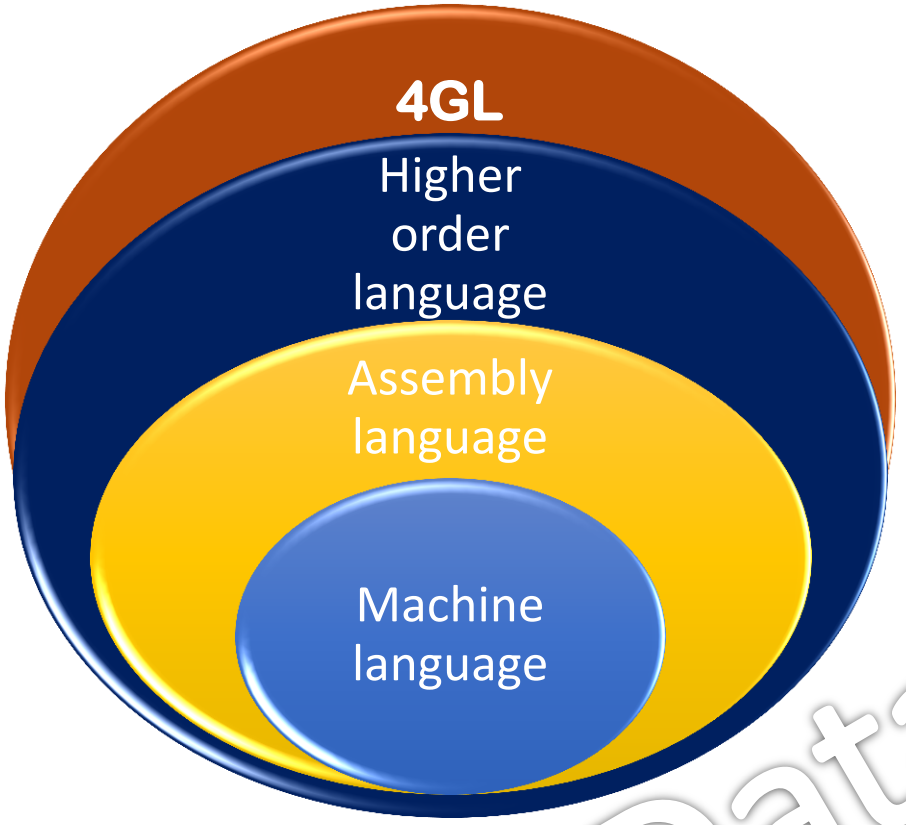
The SAS system

Portable : Multi Vendor Architecture

The SAS system

Multi Engine Architecture

Basic Concepts - Base SAS Features to Know



- Fourth Generation Language
  - Data Step
  - Procedures
  - Macro
  - SQL
- Formats – To display data in a style you want , say 20208 vs. April 30, 2015 vs. 04/30/15
- Informats – To read any type of text data
- Functions – Make data out of "stuff"

  e.g. Manipulating character values, truncate numeric values, grab month out of given date
- Output Delivery System – Customize your output

  e.g. pdf, html or output sent directly to printer

Base SAS software consists of more than 70 procedures that provide:

- **Data Access**
- Read file (xls, csv, oracle files etc.)

  eg. Proc import, proc sql,
- **Data Management**
- Data manipulation and restructuring.

  eg. Proc sort, proc transpose, proc datasets
- **Data Analysis**
- Perform descriptive statistics such as means, frequency, standard deviation, etc.

  eg. Proc freq, proc means, proc univariate etc.
- **Data Presentation**
- Produce reports that range from a simple listing of a data set to customized reports of complex relationships and analyses as well as graphics.

  eg. Proc print, proc report, proc plot

What’s on my sas session ?

Let’s run :

```
proc setinit;
run;
```

Partial log :

```
Operating System: LIN X64 .
Product expiration dates:
---Base SAS Software 16JUN2016 (CPU A)
---SAS/STAT 16JUN2016 (CPU A)
---SAS/IML 16JUN2016 (CPU A)
---SAS/Secure 168-bit 16JUN2016 (CPU A)
---SAS/ACCESS Interface to PC Files 16JUN2016 (CPU A)
---SAS/ACCESS Interface to ODBC 16JUN2016 (CPU A)
---SAS/IML Studio 16JUN2016 (CPU A)
---SAS Workspace Server for Local Access 16JUN2016 (CPU A)
---SAS Workspace Server for Enterprise Access 16JUN2016 (CPU A)
---High Performance Suite
```

Programming Basics

Outline

- Programming Basics : Structure of SAS Programs
  -SAS steps, statements, step boundaries, comments
- SAS syntax rules
- Type of errors :
  -Syntax Errors
- Handling Syntax Errors

Programming Basics : Structure of SAS Programs

Sequence of SAS statements form a step.

```
data work.test_results;   1
  set datalib.University_test;   2
run;   3
```

Sequence of steps build a SAS program.

```
data work.test_results;
  set datalib.University_test;
run;
```
1

```
Proc print data=work.test_results;
Run;
```
2

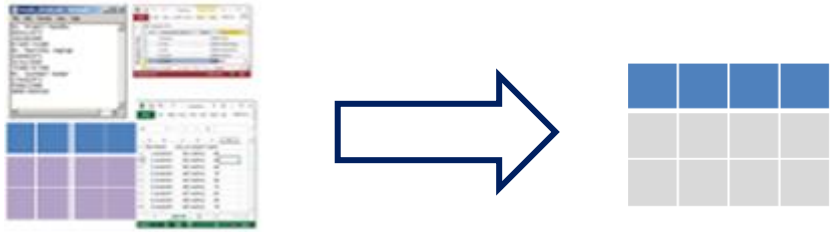
There are two type of steps in SAS :

- ✓ DATA step
- ✓ PROC step

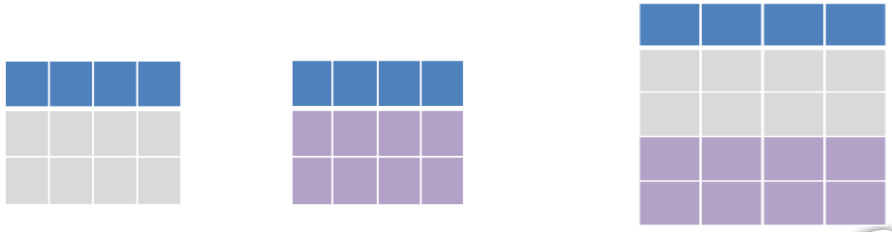
```
data work.test_results;
  set datalib.University_test;
run;
```

```
Proc print data=work.test_results;
run;
```

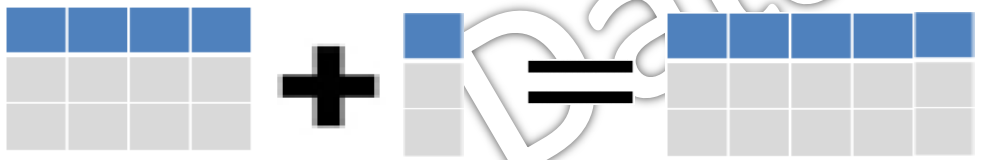
The DATA step is used to:



- read data, especially text data



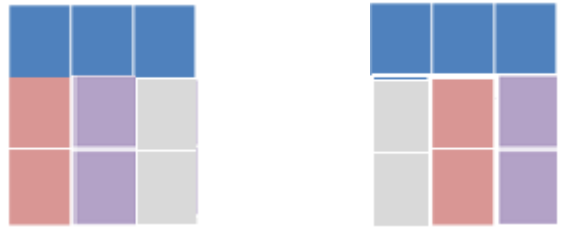
- create new data sets



- create new variables

- subset data sets

- concatenate, merge and update data sets



- restructure data

…and a lot!

The PROC step is used to:

Pre- written procedures in Base SAS can be used to perform various tasks such as :

Obs	country_of_export	Date	HS_Code	Qty_	Unit
1	MALAYSIA	22JAN2014	84799020	16	PCS
2	MALAYSIA	22JAN2014	84799020	16	PCS
3	MALAYSIA	22JAN2014	84799020	16	PCS
4	MALAYSIA	22JAN2014	73269099	6	SET
5	MALAYSIA	22JAN2014	73269099	8	PCS

- Detail

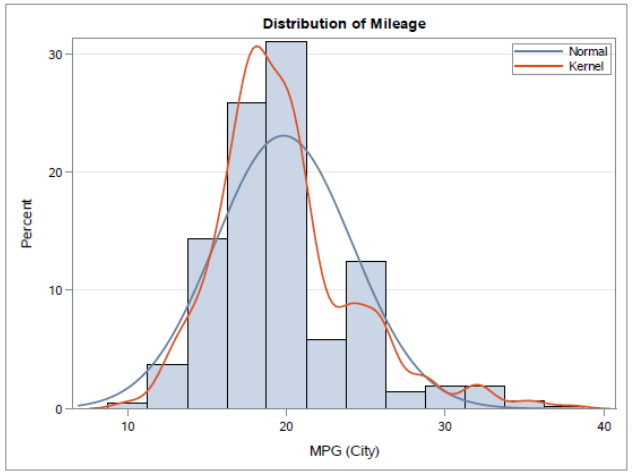
The FREQ Procedure

Country of Export				
country_of_export	Frequency	Percent	Cumulative Frequency	Cumulative Percent
INDONESIA	111	53.11	111	53.11
IRAQ	5	2.39	116	55.50
ITALY	7	3.35	123	58.85
MALAYSIA	39	18.66	162	77.51
NIGERIA	5	2.39	167	79.90
SAUDI ARABIA	14	6.70	181	86.60
SPAIN	2	0.96	183	87.56
UNITED ARAB EMIRATES	12	5.74	195	93.30
UNITED STATES	14	6.70	209	100.00

- Summary

	Qty.
	Sum
Country of Export	
INDONESIA	141418.52
IRAQ	460006.39
ITALY	33260.00
MALAYSIA	223078.20
NIGERIA	341010.79
SAUDI ARABIA	1170681.36
SPAIN	4650.00
UNITED ARAB EMIRATES	563920.76
UNITED STATES	312.00

- Tabular



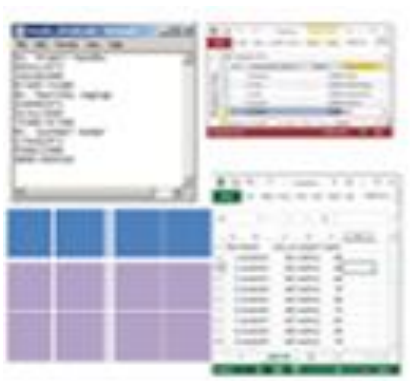
- Graphical

The MEANS Procedure

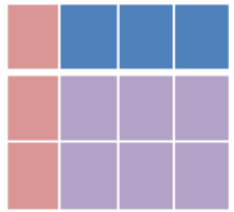
Analysis Variable : Qty_ Qty.						
Country of Export	N Obs	N	Mean	Std Dev	Minimum	Maximum
INDONESIA	111	111	1274.04	985.7123599	98.6010000	5000.00
IRAQ	5	5	92001.28	13144.71	68836.00	100047.92
ITALY	7	7	4751.43	5686.94	600.0000000	14400.00
MALAYSIA	39	39	5719.95	14104.75	2.0000000	66009.77
NIGERIA	5	5	68202.16	51561.00	12.0000000	137661.00
SAUDI ARABIA	14	14	83620.10	35239.11	42000.00	146461.00
SPAIN	2	2	2325.00	2227.39	750.0000000	3900.00
UNITED ARAB EMIRATES	12	12	46993.40	24249.45	19265.84	91299.00
UNITED STATES	14	14	22.2857143	32.1616795	1.0000000	120.0000000

- Statistical

Typical Flow of SAS Programs



```
data new;
set old;
....
;
run;
```



```
...
Proc xxx
data=new;
....
;
run;
...
```

Obs	Type	total_invoice
1	Hybrid	55288
2	SUV	1897521
3	Sedan	7176127

Example of Typical Program

```
data work.test_results;
   length roll_no $ 4 Name $ 12
subject $6;
   infile 'students.csv' dlm=',';
   input Name $ roll_no $ subject $
         marks;
run;
```

DATA STEP

```
proc print data= work.test_results;
run;
```

PROC STEP

Step Boundaries

```
data work.test_results;
   length roll_no $ 4 Name $ 12 subject $6;
   infile ‘students.csv' dlm=',';
   input Name $ roll_no $ subject $ marks;
run;
```

RUN statement acts as a step boundary

```
proc sql;
Create table new select name marks
 from work.test_results;
quit;
```

QUIT statement acts as a step boundary

- ✓ RUN
- ✓ QUIT
- ✓ Start of another step (DATA or PROC)

acts as **step boundaries**

Step Boundaries

```
proc print data= work.test_results;
```

Data statement acts as a step boundary

```
Data percent;
Set new;
Percentage=marks/750*100;
```

There is NO step boundary here!!

- ✓ RUN
- ✓ QUIT
- ✓ Start of another step (DATA or PROC)

acts as **step boundaries**

Various modes for running a SAS Program

Various modes for running SAS program are :

- ✓ interactive mode

  (e.g.: SAS Studio, SAS windowing environment ,SAS EG)
- ✓ batch mode
- ✓ non interactive mode

Three Primary Windows

You submit and view the results of a SAS program in the SAS windowing environment using three primary windows.

CODE	contains the SAS program to submit.
LOG	contains information about the processing of the SAS program, including any warning and error messages.
OUTPUT	contains reports generated by the SAS program.

Code or Editor Window

```
data work.test_results;
   length roll_no $ 4 Name $ 12  subject $ 6;
   infile 'students.csv ' dlm=',';
   input Name $ roll_no $ subject $  marks;
run;
```

STEP KEYWORDS

Code or Editor Window

STATEMENT KEYWORDS

```
data   work.test_results;

  length roll_no $ 4 Name $ 12  subject $ 6;
  infile    'students.csv ' dlm=',';
  input  Name $ roll_no $ subject $  marks;

run;
```

Code or Editor Window

```
data   work.test_results ;

  length roll_no $ 4 Name $ 12  subject $ 6 ;
  infile   'students.csv ' dlm=',' ;
  input  Name $ roll_no $ subject $  marks ;

run ;
```

Semicolon ends statement.

Log Window

```
33   data work.test_results;
34 length roll_no $ 4 Name $ 12
35              subject $6  ;
36      infile ‘students.csv'  dlm=',';
37 input Name $ roll_no $ subject $
38               marks;
39   run;

NOTE: The infile 'students.csv' is:
      File Name=E:\SAS_Class\students.csv,
      RECFM=V,LRECL=256

NOTE: 252 records were read from the infile
‘students.csv'.
      The minimum record length was 28.
      The maximum record length was 47.
NOTE: The data set WORK.test_results has 252
observations and 4 variables.

40
41   proc print data=work.test_results;
42   run;

NOTE: There were 252 observations read from the data
set WORK.test_results.
```

Output Window

Obs	Name	roll_no	subject	marks
1	student1	101	maths1	80
2	student2	102	maths1	85
3	student3	103	maths1	84
4	student4	104	maths1	79
5	student5	105	maths1	88
6	student6	106	maths1	73
7	student7	107	maths1	85
8	student8	108	maths1	84
9	student9	109	maths1	79
10	student10	110	maths1	88
11	student11	111	maths1	73
12	student12	112	maths1	92
13	student13	113	maths1	67
14	student14	114	maths1	89
15	student15	115	maths1	73
16	student16	116	maths1	92
17	student17	117	maths1	67
18	student18	118	maths1	89
19	student19	119	maths1	78
20	student20	120	maths1	83
21	student21	121	maths1	82
22	student22	122	maths1	77

SAS Comments

- Comments make program easier to read and edit.
- Comments are used to document notes about the programming flow for a programmer/ reviwer.
- SAS does not execute comments.
- Comments can occur anywhere in the program.
- Two methods of commenting:

/* comment */

*** comment ;**

```
/*This program creates and uses the
data set called work.test_results.*/        1


 data work.test_results;
   length roll_no $ 4 Name $ 12
          subject $6;
infile 'students.csv' dlm=',';
  input Name $ roll_no $ /*character*/  2
subject $  marks ;
run;
/*                    3
proc print data=work.test_results;
run;
*/
proc means data=work.test_results;
  *class Name;        4
  var marks;
run;
```

SAS Syntax Rules

Structured, consistent spacing makes a SAS program easier to read.

```
data   work.test_results;
          length roll_no $ 4 Name $ 12  subject $ 6;
          infile 'students.csv ' dlm=',';
          input Name $ roll_no $ subject $  marks;
run;

proc print data=work.test_results;
run;

proc means data=work.test_results;
          class Name;
          var marks;
run;
```

GOOD Formatting

SAS Syntax Rules

BAD Formatting

```
data work.test_results;
 length roll_no $ 4 Name $ 12  subject $ 6;
 infile 'students.csv ' dlm=',';input Name $
roll_no $
subject $  marks;run;
proc print data=work.test_results;run;
proc means data=work.test_results;
 class Name;
 var marks;run;
```

Syntax Errors

- Syntax errors occur when program statements do not follow to the rules of the SAS language.
- When syntax error occurs, SAS prints an error message or a warning to the log.
- SAS stops processing if error message displays to the log.

Examples of syntax errors:

1. Misspelled keywords

```
prog print data = sashelp.air;
run;
```

Partial log :

WARNING 14-169: Assuming the symbol PROC was misspelled as prog.

REMEMBER!
We are using SAS Studio(SAS Univ Edition), which auto corrects certain errors .

Examples of syntax errors:

2. Unmatched quotation marks

```
proc print data=sashelp.cars;
where Type = 'SUV;
run;
```

Partial log :

NOTE: No observations were selected from data set SASHELP.CARS.
NOTE: There were 0 observations read from the data set SASHELP.CARS.
WHERE 0 /* an obviously FALSE WHERE clause */ ;

Examples of syntax errors:

3. Missing semicolons

```
proc print data= sashelp.cars
run;
```

Partial log :

ERROR 22-322: Syntax error, expecting one of the following: ;, (, BLANKLINE, CONTENTS, DATA, DOUBLE, GRANDTOTAL_LABEL,
GRANDTOT_LABEL, GRAND_LABEL, GTOTAL_LABEL, GTOT_LABEL, HEADING, LABEL, N, NOOBS, NOSUMLABEL, OBS, ROUND, ROWS, SPLIT,
STYLE, SUMLABEL, UNIFORM, WIDTH.
ERROR 202-322: The option or parameter is not recognized and will be ignored.

This syntax error is difficult to recognize.

Examples of syntax errors:

4. Invalid options

```
proc means data=sashelp.cars average;
run;
```

Partial log :

ERROR 22-322: Syntax error, expecting one of the following: ;, (, ALPHA, CHARTYPE, CLASSDATA, CLM, COMPLETETYPES, CSS, CV, DATA,
DESCEND, DESCENDING, DESCENDTYPES, EXCLNPWGT, EXCLNPWGTS, EXCLUSIVE, FW, IDMIN, KURTOSIS, LCLM, MAX, MAXDEC, MEAN,
MEDIAN, MIN, MISSING, MODE, N, NDEC, NMISS, NOLABELS, NONOBS, NOPRINT, NOTHREADS, NOTRAP, NWAY, ORDER, P1, P10, P20,
P25, P30, P40, P5, P50, P60, P70, P75, P80, P90, P95, P99, PCTLDEF, PRINT, PRINTALL, PRINTALLTYPES, PRINTIDS, PRINTIDVARS, PROBT, Q1, Q3, QMARKERS, QMETHOD, QNTLDEF, QRANGE, RANGE, SKEWNESS, STACKODS, STACKODSOUTPUT, STDDEV,
STDERR, SUM, SUMSIZE, SUMWGT, T, THREADS, UCLM, USS, VAR, VARDEF.
ERROR 202-322: The option or parameter is not recognized and will be ignored.

Try it !

Run Your first program :

1. Open editor and type and submit following program :

```
Proc setinit;
Run;
```

2. What did you observe : In output window, results window and log window.

Assignment1

Print first 15 observations

1. Open editor and type and submit following program :

```
proc print data= sashelp.air (obs=15);
run;
```

2. What did you observe : In output window, results window and log window.

Assignment2

Distribution of Cholesterol for dead and alive males and females

1. Open editor and type and submit following program :

```
proc means data= sashelp.heart  maxdec=2;
class status sex ;
var Cholesterol;
run;
```

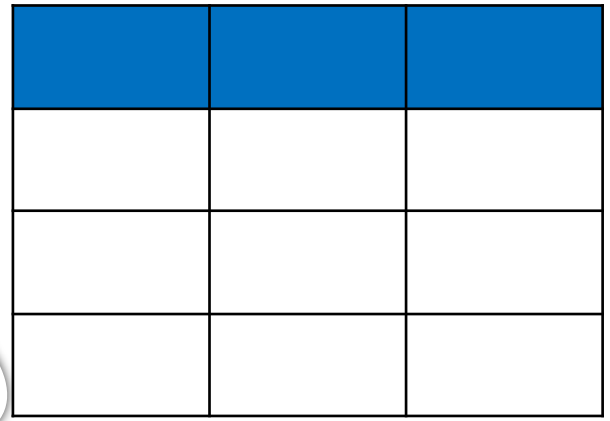
2. What did you observe : In output window, results window and log window.

SAS Help

Let’s learn to take help from the SAS help!

http://support.sas.com/software/products/sasstudio/index.html#s1=2

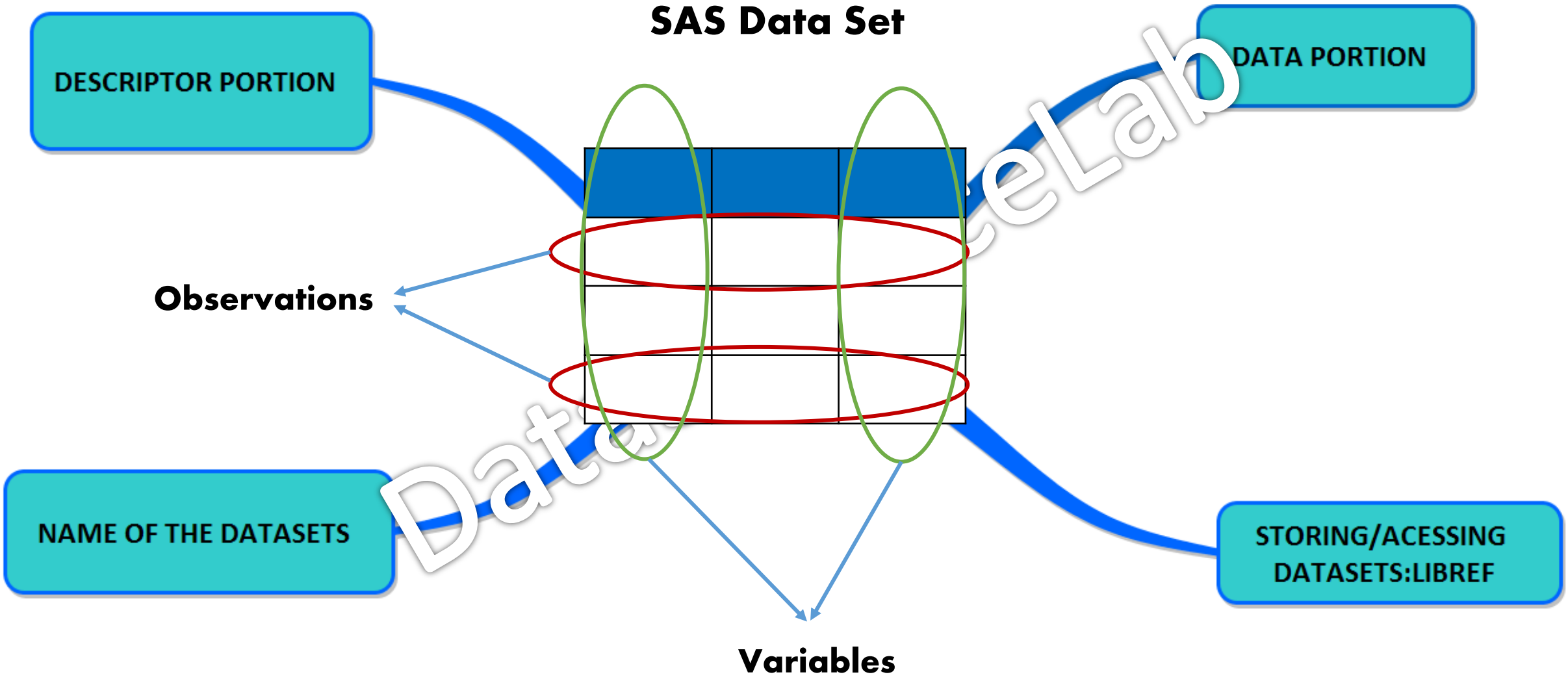
Note: This course focuses on using SAS University Edition (SAS Studio).

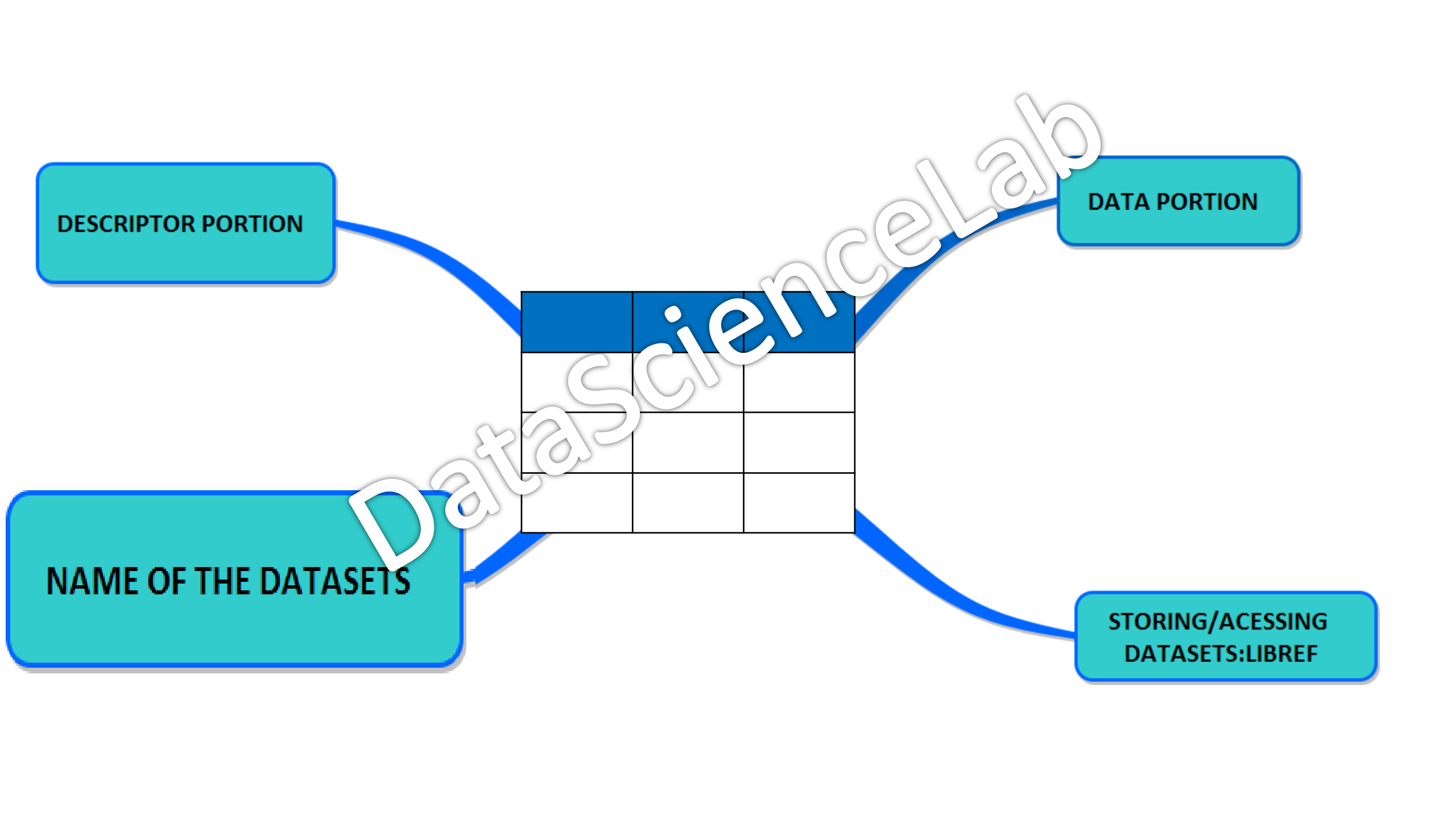


SAS Data Sets

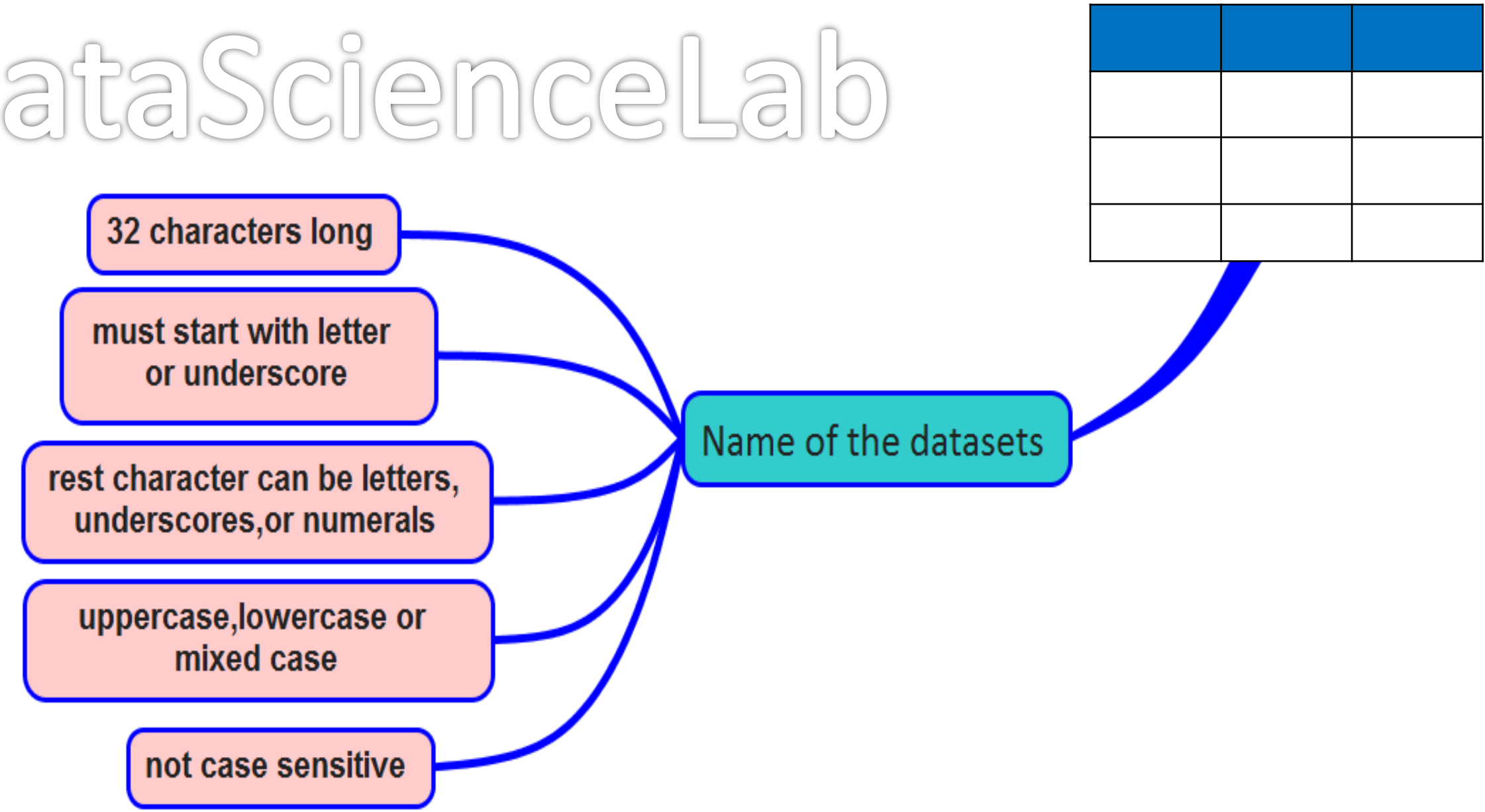
Outline

- Rules for SAS dataset
- Parts of SAS data sets
- Storing SAS datasets
- Accessing SAS datasets


SAS Data Set
DESCRIPTOR PORTION
DATA PORTION
Observations
NAME OF THE DATASETS
STORING/ACESSING DATASETS:LIBREF
Variables

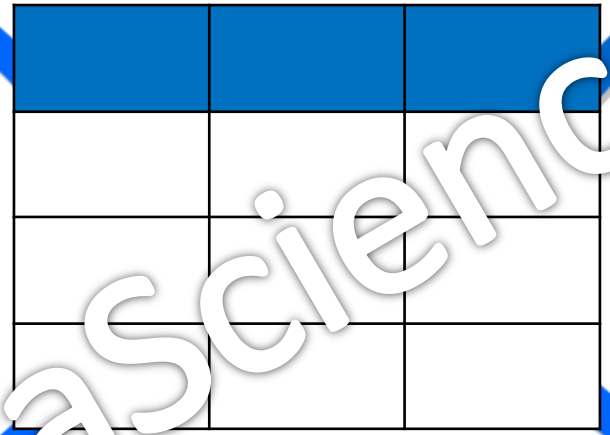

DESCRIPTOR PORTION
DATA PORTION
NAME OF THE DATASETS
STORING/ACESSING DATASETS:LIBREF
DataScienceLab

DataScienceLab



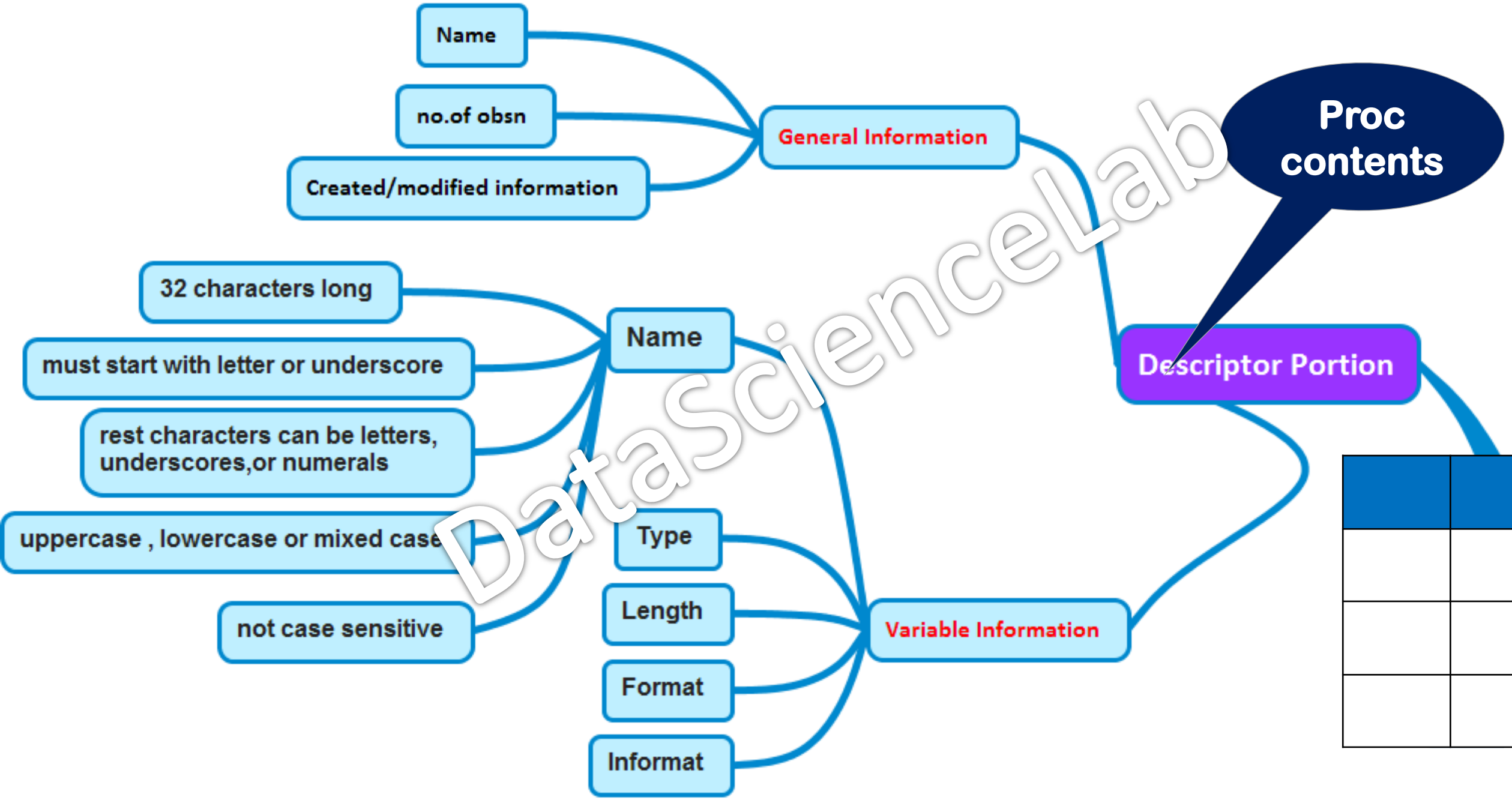
DESCRIPTOR PORTION

DATA PORTION



NAME OF THE DATASETS

STORING/ACESSING DATASETS:LIBREF


Proc contents
Descriptor Portion
General Information
Name
no.of obsn
Created/modified information
Variable Information
Name
32 characters long
must start with letter or underscore
rest characters can be letters, underscores,or numerals
uppercase , lowercase or mixed case
not case sensitive
Type
Length
Format
Informat
DataScienceLab

SAS Data Set

A SAS data set is a file that SAS creates and processes.

Data Set Name	SASHELP.CARS	Observations	428
Member Type	DATA	Variables	15
Engine	V9	Indexes	0

Obs	Make	Model	Type	Origin	DriveTrain	MSRP	Invoice	EngineSize
1	Acura	MDX	SUV	Asia	All	$36,945	$33,337	3.5
2	Acura	RSX Type S 2dr	Sedan	Asia	Front	$23,820	$21,761	2.0
3	Acura	TSX 4dr	Sedan	Asia	Front	$26,990	$24,647	2.4
4	Acura	TL 4dr	Sedan	Asia	Front	$33,195	$30,299	3.2
5	Acura	3.5 RL 4dr	Sedan	Asia	Front	$43,755	$39,014	3.5

Descriptor Portion

Data Portion

The Descriptor Portion

Use PROC CONTENTS to display the descriptor portion of a data set.

Syntax :

PROC CONTENTS DATA=*SAS-data-set*;
RUN;

Example:

```
proc contents data=sashelp.heart;
run;
```

The Descriptor Portion

Data Set Name	SASHELP.HEART	**Observations**	5209
Member Type	DATA	**Variables**	17
Engine	V9	**Indexes**	0
Created	06/13/2013 06:39:51	**Observation Length**	168
Last Modified	06/13/2013 06:39:51	**Deleted Observations**	0
Protection		**Compressed**	NO
Data Set Type		**Sorted**	NO
Label	Framingham Heart Study		
Data Representation	SOLARIS_X86_64, LINUX_X86_64, ALPHA_TRU64, LINUX_IA64		
Encoding	us-ascii ASCII (ANSI)		

Alphabetic List of Variables and Attributes

#	Variable	Type	Len	Label
12	AgeAtDeath	Num	8	Age at Death
5	AgeAtStart	Num	8	Age at Start
3	AgeCHDdiag	Num	8	Age CHD Diagnosed
15	BP_Status	Char	7	Blood Pressure Status
14	Chol_Status	Char	10	Cholesterol Status
13	Cholesterol	Num	8	
2	DeathCause	Char	26	Cause of Death
8	Diastolic	Num	8	
6	Height	Num	8	
10	MRW	Num	8	Metropolitan Relative Weight
4	Sex	Char	6	
11	Smoking	Num	8	
17	Smoking_Status	Char	17	Smoking Status
1	Status	Char	5	
9	Systolic	Num	8	
7	Weight	Num	8	
16	Weight_Status	Char	11	Weight Status

Partial output

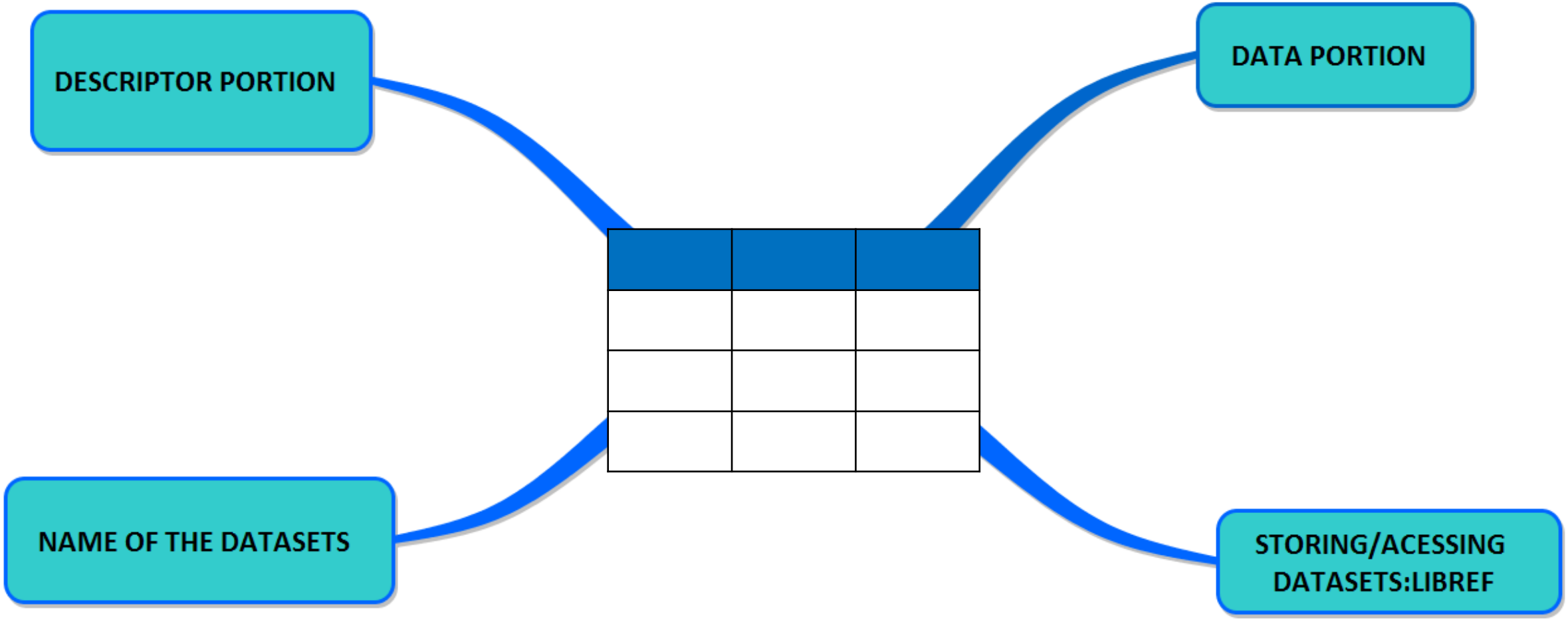
Assignment1

Find out the option to get the logical listing.

```
proc contents data=sashelp.heart varnum;
run;
```

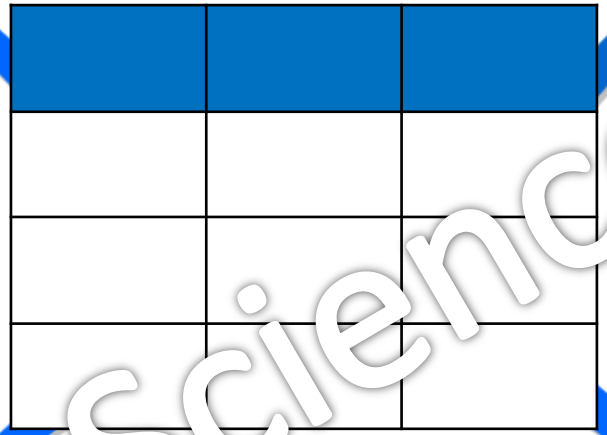
Assignment2

Descriptor portion of sashelp.air



DESCRIPTOR PORTION

DATA PORTION



NAME OF THE DATASETS

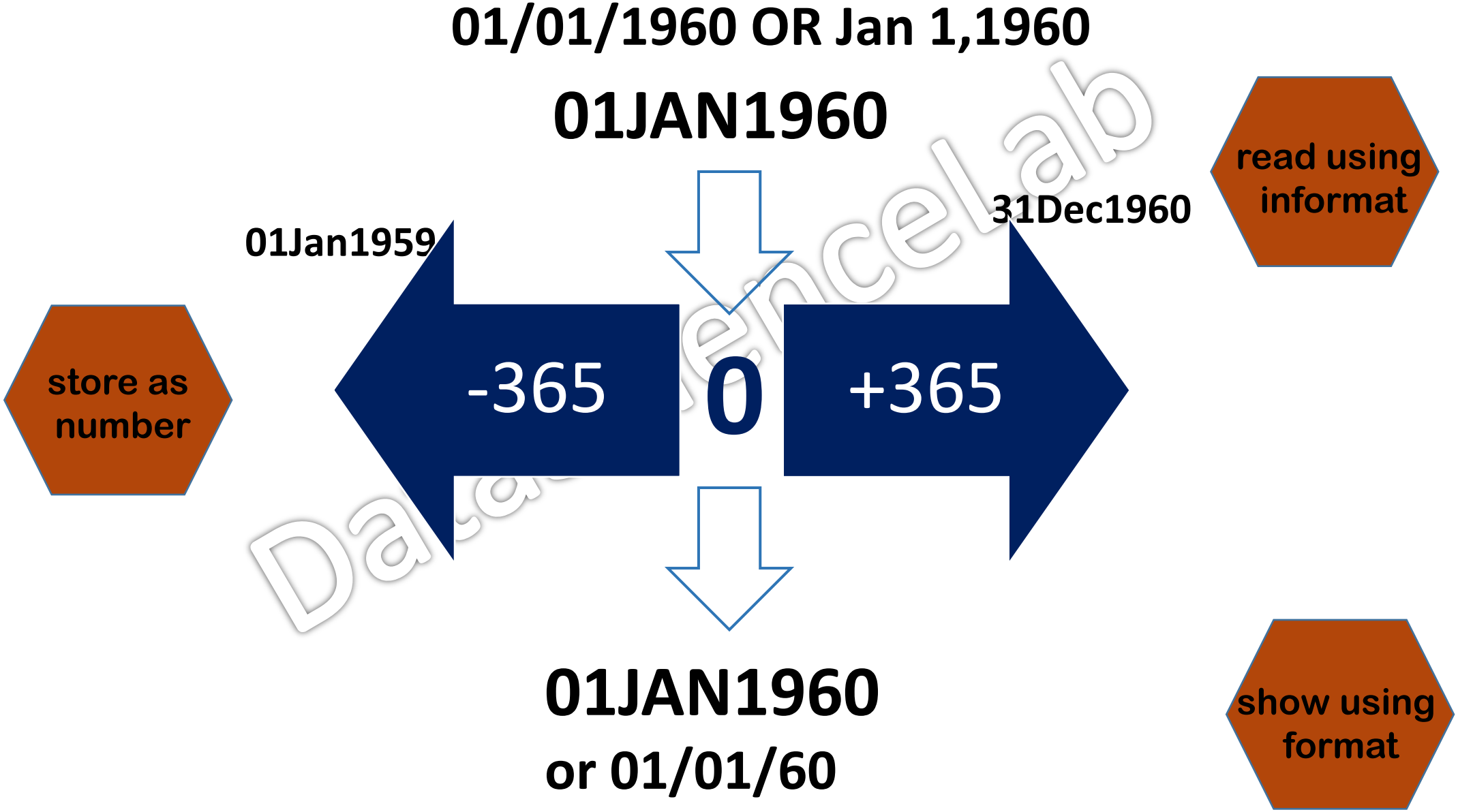
STORING/ACESSING DATASETS:LIBREF

Proc print

Data Portion

- Display in table form
  - observation
    - rows
  - variables
    - columns
- Values
  - character
    - aA-zZ , numbers,special,blank
      - stored as length of 1 to 32767 bytes
        - one byte equal one character
      - case sensitive
    - missing as blank
  - numeric
    - numbers
      - stored as floating point numbers in 8 bytes of storage by default
        - Eight bytes of floating point storage provide space for 16 or 17 significant digits (not restricted to 8 digits)
      - missing as periods(.)
    - date
      - calculated from 01Jan1960
    - time
      - calculated from 00:00:00 midnight
    - datetime
      - calculated from midnight 00:00:00 of 01Jan1960

Dates in SAS are numbers



Representation of Date, time and date time

```
data test;
dt='03Jan2016'd;
tm='11:00:00't;
dttm='03Jan2016 11:00:00'dt;
run;
```

```
proc print data=test;
run;
```

Obs	dt	tm	dttm
1	20456	39600	1767438000

```
proc print data=test;
format dt date9.
tm time8.
dttm datetime17.;
run;
```

Obs	dt	tm	dttm
1	03JAN2016	11:00:00	03JAN16:11:00:00

The Data Portion

Use the PRINT procedure to see the data portion of a SAS data set.

Syntax :

```
PROC PRINT DATA=SAS-data-set  <options> ;
…
RUN;
```

By default, PROC PRINT displays the following:

- ✓ all observations
- ✓ all variables
- ✓ an obs column on the left side

The Data Portion

Example :

```
proc print data=sashelp.air;
run;
```

Obs	DATE	AIR
1	JAN49	112
2	FEB49	118
3	MAR49	132
4	APR49	129
5	MAY49	121
6	JUN49	135
7	JUL49	148
8	AUG49	148
9	SEP49	136
10	OCT49	119
11	NOV49	104
12	DEC49	118
13	JAN50	115
14	FEB50	126
15	MAR50	141
16	APR50	135
17	MAY50	125
18	JUN50	149
19	JUL50	170
20	AUG50	170
21	SEP50	158
22	OCT50	133
23	NOV50	114
24	DEC50	140

Partial output

Options for browsing the Data Portion

Syntax :

```
PROC PRINT DATA=SAS-data-set  (obs=n) ;
VAR variable(s);
RUN;
```

Example :
```
PROC PRINT DATA=sashelp.air  (obs=10) ;
VAR AIR  date ;
RUN;
```


- The obs=n option prints only first n obersvations.
- The VAR statement selects variables and determines their order in the report.

Assignment1

Browse various portion of sashelp.heart

1. See the descriptor portion of sashelp.heart
2. See the data portion of sashelp.heart
3. Select Status, DeathCause , Sex ,AgeAtStart, Height, Weight,Smoking ,AgeAtDeath,Weight_Status variables
4. Print only first 25 obersvations (obs=25)

Assignment2

Few options to print sashelp.heart

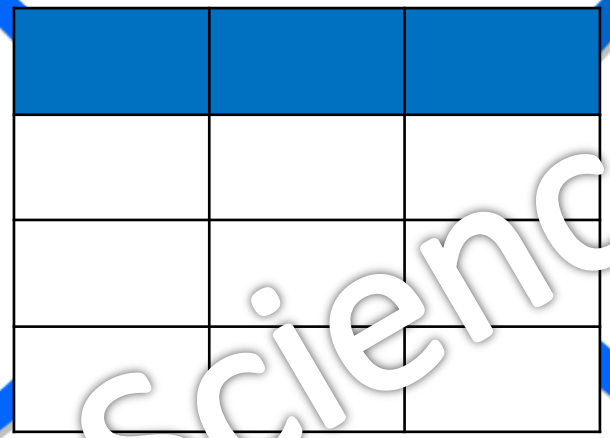
1. Select Status, Sex , Height ,Weight , Cholesterol ,Chol_Status, Weight_Status variables
2. Use noobs option in the proc print statement

Note : noobs option surpresses the observation number column

Accessing SAS Data Libraries

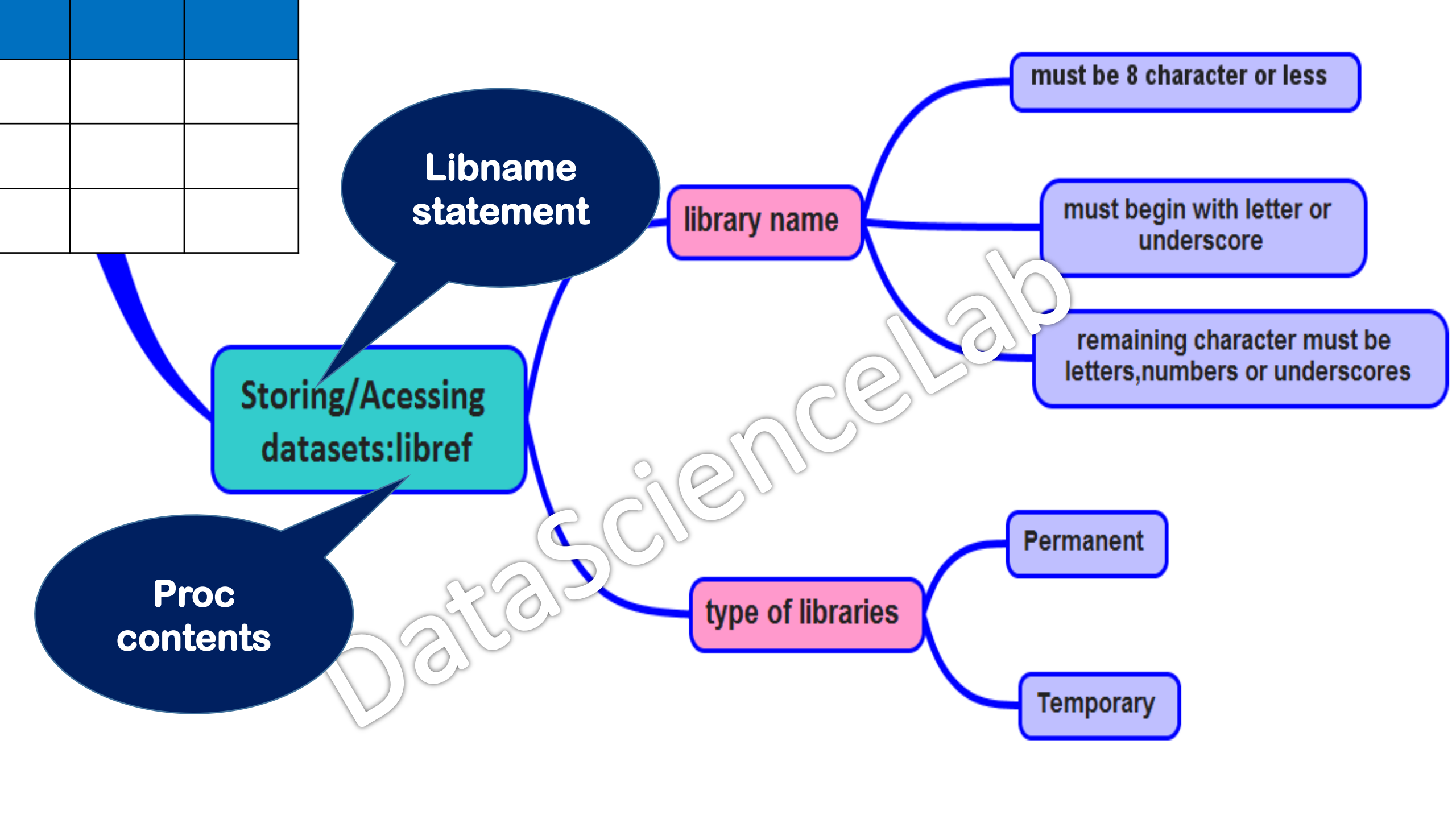
DESCRIPTOR PORTION

DATA PORTION



NAME OF THE DATASETS

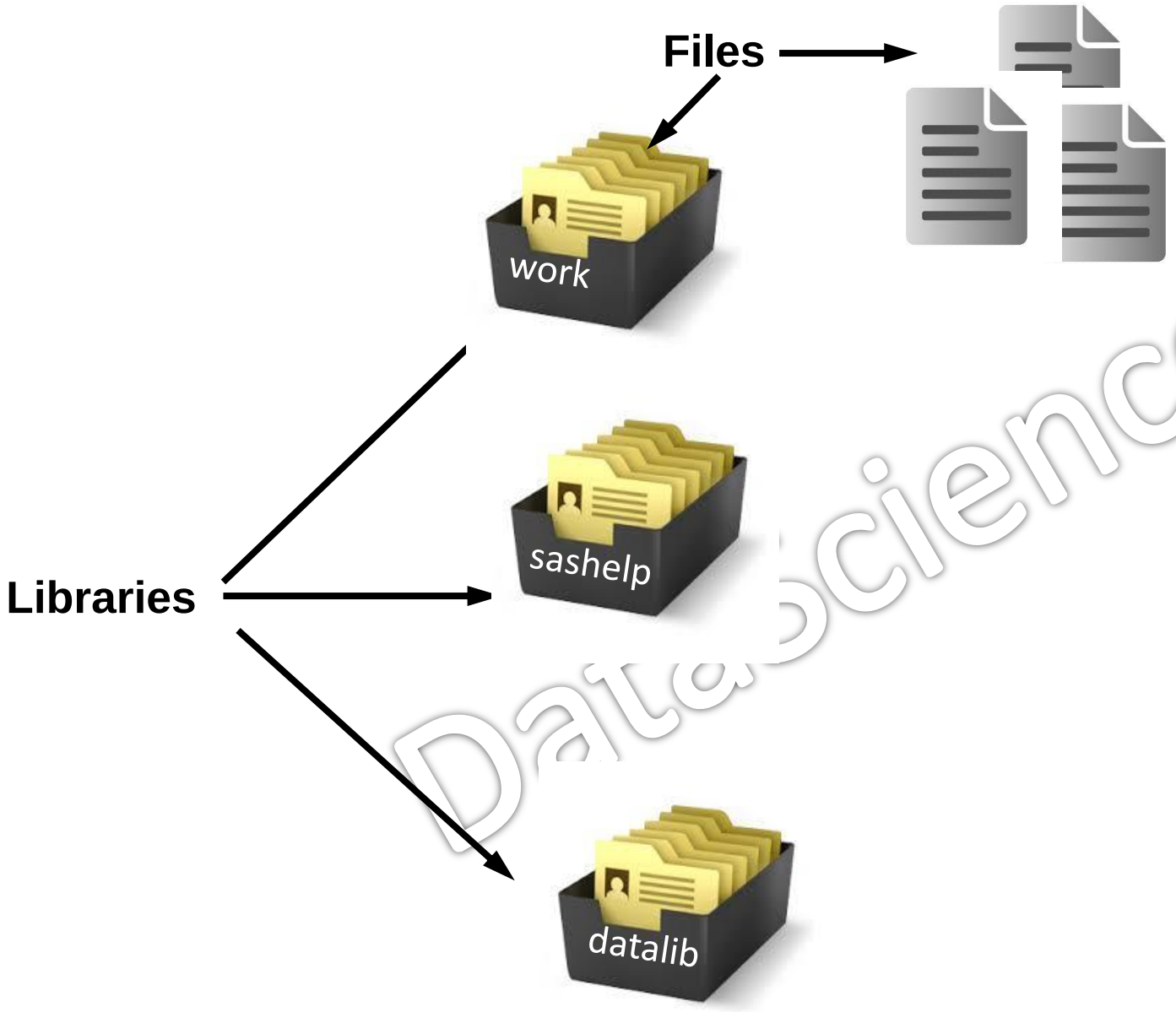
STORING/ACESSING DATASETS:LIBREF


Libname statement
Storing/Acessing datasets:libref
Proc contents
library name
must be 8 character or less
must begin with letter or underscore
remaining character must be letters,numbers or underscores
type of libraries
Permanent
Temporary
DataScienceLab

Outline :

- Introduction to SAS library
- Type of libraries
- LIBNAME statement
- Proc contents to see the contents of Library

SAS Libraries



A SAS data library is a collection of SAS files that are recognized as a unit by SAS.

Defining SAS Library

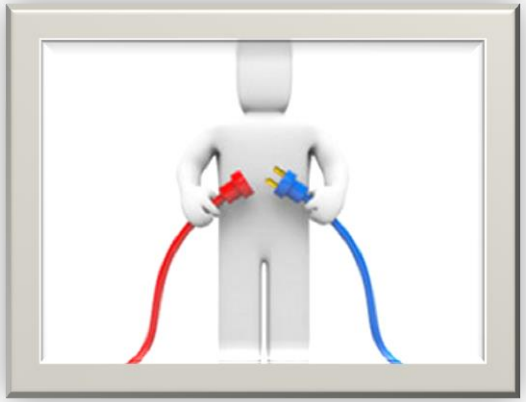
Installation	Pointed to
Windows (BASE/EG etc.)	**E:\dataloc**
UNIX	**/users/*userid***
z/OS (OS/390)	***userid*.dataloc.sasdata**
SAS UNIV. EDITION	**/folders/MyFolders/dataloc** (actual folder : E:\SASUNIVEDITION\myfolders\dataloc)

Defining SAS Library

Syntax : **LIBNAME** libref 'SAS-data-library' <options>;

Example: For SAS UNIV. EDITION :

libname datalib '/folders/MyFolders/dataloc';



LIBNAME statement makes a connection between a library reference in SAS and the physical location of files on the operating system.

Two type of libraries : Temporary and Permanent

Temporary library : The contents of the library are lost permanently when we end our SAS session.

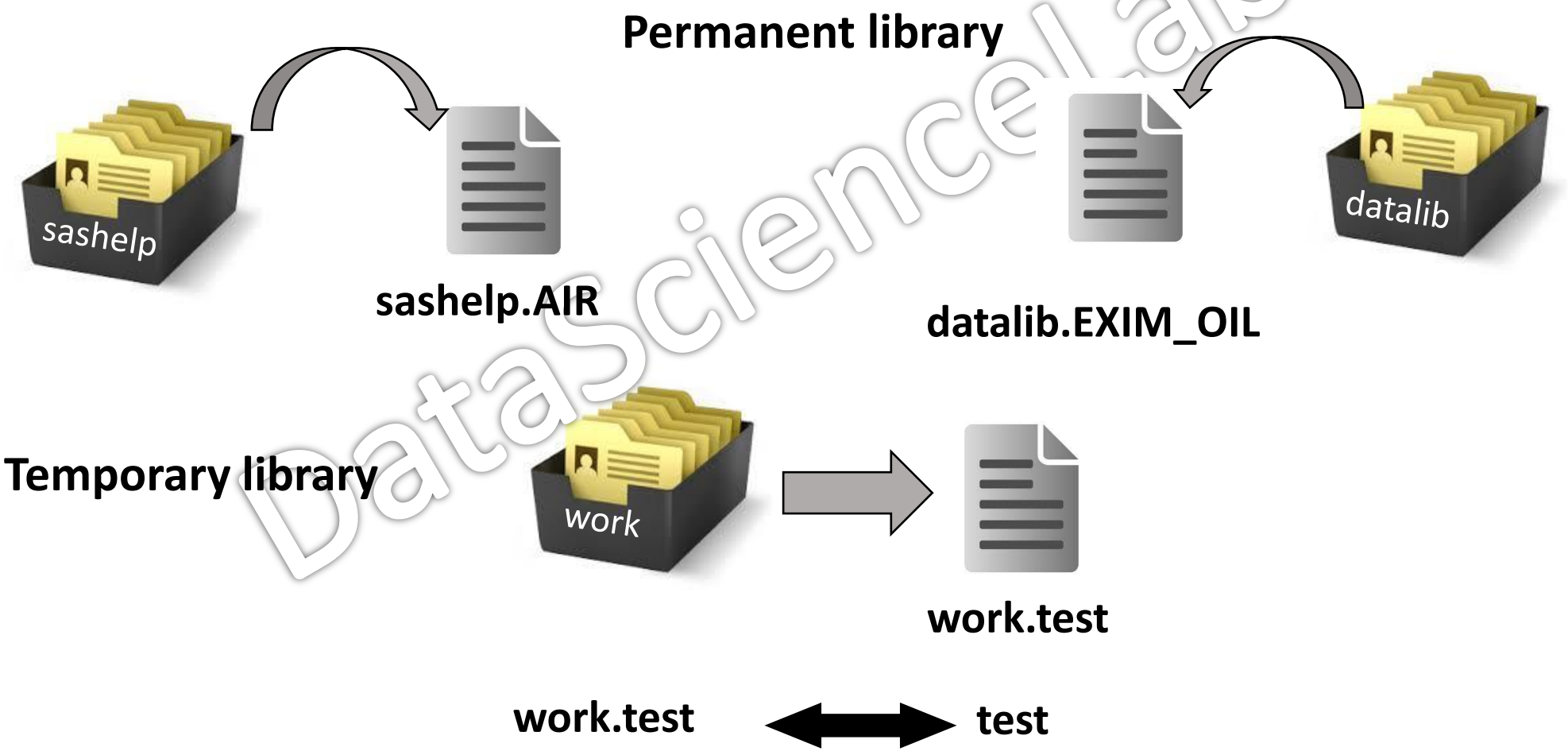
WORK is a default temporary library.

Permanent library : The contents of the library are retained permanently when we end our SAS session. The library reference might be lost from SAS, but the data is still accessible through the actual directory/folder. Also, one can reassign the library reference to get contents of the library in SAS.

SASHELP, SASUSER are default permanent libraries. We can also create and access our own permanent libraries.

Referencing SAS datasets from Temporary and Permanent of libraries

Every SAS file is has with a two-level name: libref.filename



Contents of a SAS Library

Use proc contents to see all the SAS files in the librar. To see the list of all the SAS files in the particular library at a time , we use the _ALL_ keyword.

If we use the NODS option, it will hide the descriptor portions of all the data sets and only list of SAS files is shown.

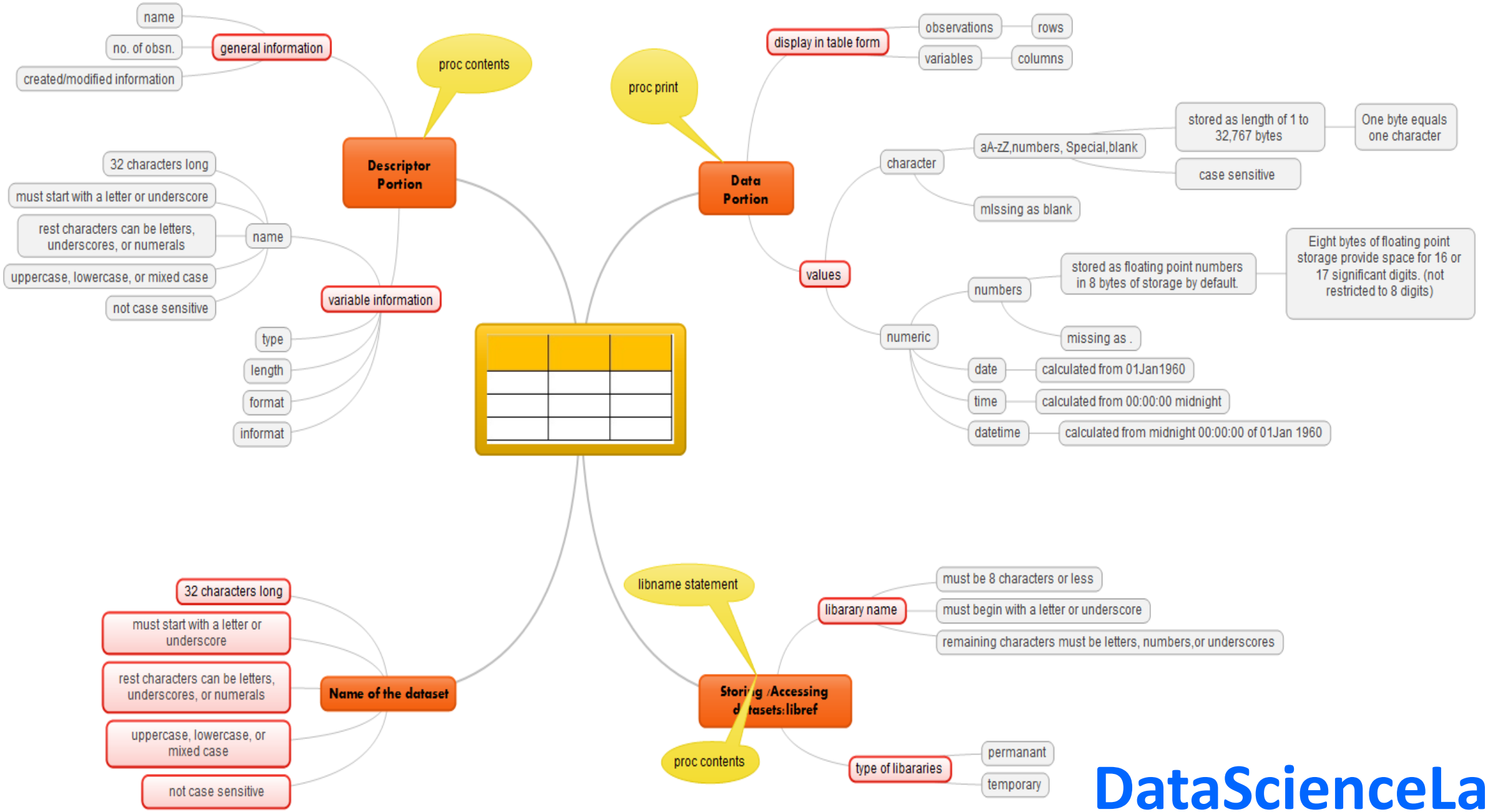
Remember, NODS can be used only along with the _ALL_ keyword.

```
PROC CONTENTS DATA=libref._ALL_ NODS;
RUN;
```

Task

Browsing a SAS Data Library

1. See the contents of datalib library without using NODS option
2. See the contents of datalib library using NODS option
3. What is the difference ?



DataScienceLab

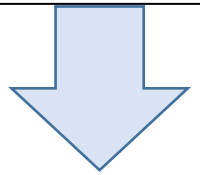
Accessing data in SAS

Outline

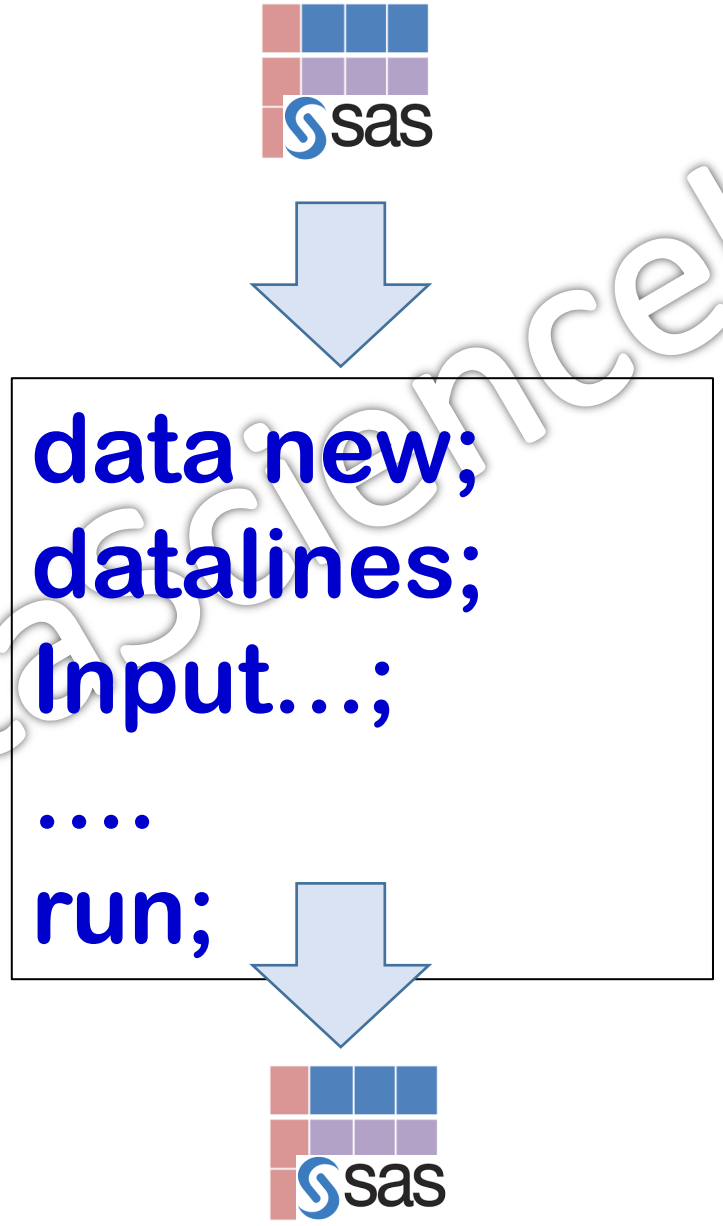
- Reading in stream data
- Reading from SAS data sets
- Reading from external files

Data sources to create SAS data set


```
data new;
...;
....
run;
```



Reading in stream data



Reading In stream Data

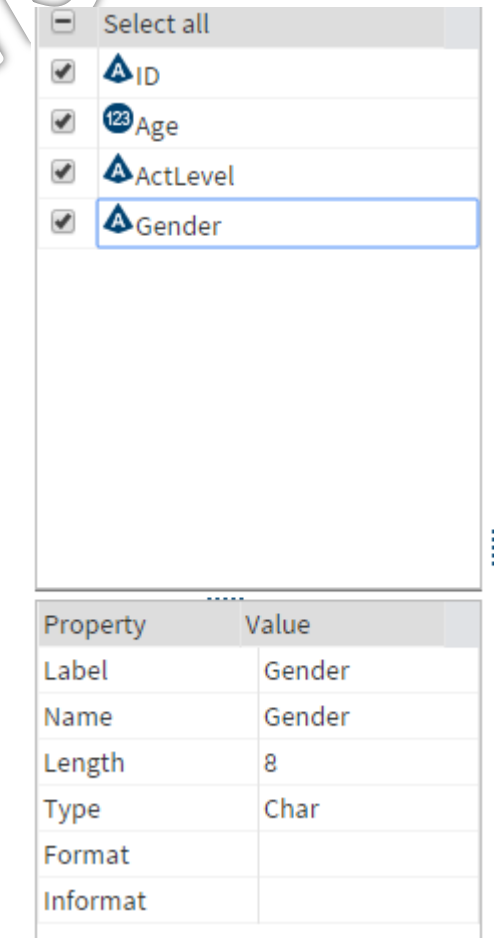
- To read data directly in your SAS program
- To read in stream data:
  - A DATALINES statement is placed as the last statement, immediately preceding data lines.
  - A null statement (single semicolon) to indicate end of input data.
  - Only one DATALINE statement can be used in a DATA step.
  - Do not need a RUN statement after null statement. DATALINE statement works as step boundary.

Reading In stream Data

```
data work.exercise;
input ID $ Age ActLevel $ Gender $;
datalines;
1000 61 MOD  F
1001 38 HIGH M
1002 42 LOW  M
1003 26 HIGH F
1004 50 MOD  M
1005 25 HIGH F
;
;
```

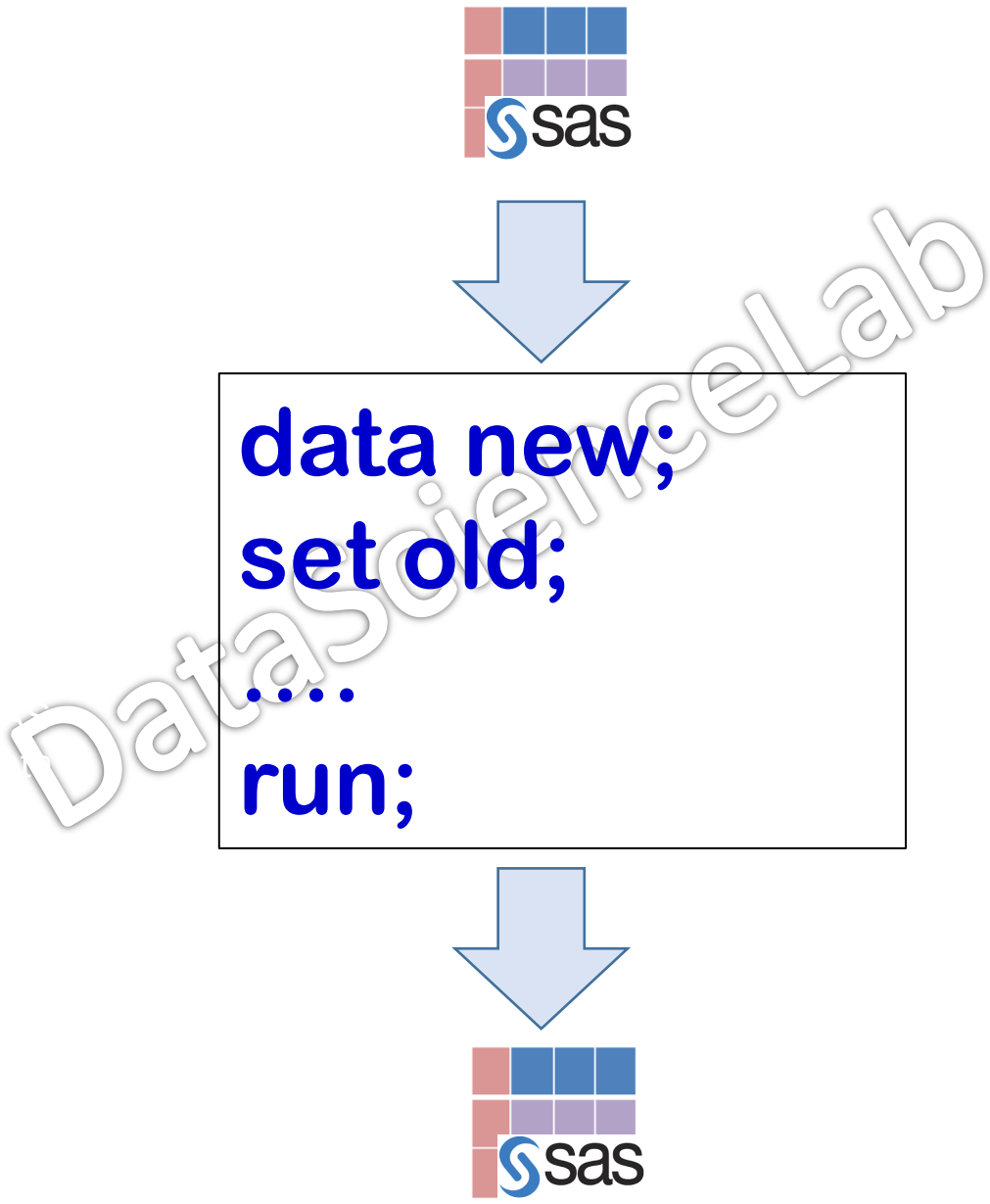
```
NOTE: The data set WORK.EXERCISE has 6 observations
and 4 variables.
```

By default, character variable is also 8 bytes



Reading SAS data set to SAS data set

Reading SAS data set to SAS data set



Read SAS dataset from SAS dataset

Syntax:

```
data emps2;
set datalib.emps2;
run;
```

Temporary

Permanent

- ✓Read from permanent &/or temporary data set into permanent &/or temporary data set

- ✓It creates exact copy of input dataset unless instructed

Read SAS dataset from SAS dataset

Partial output

EMPID	HIRE_DATE	SERVICEYRS	SALARY
101	13OCT1980	34.5079	146230
102	13OCT1973	41.5086	126960
103	13NOV1973	41.4237	130475
104	13JUN1989	25.8426	533800

Partial log

NOTE: There were **44 observations read** from the data set **datalib.emps2.**

NOTE: The data set **WORK.EMPS2** has **44 observations and 4 variables.**

Read SAS dataset from SAS dataset

There is no restriction on number of datasets to be output

```
data emps2 newemps employees;
set datalib.emps2;
run;
```

Partial log

NOTE: There were **44 observations read** from the data set **DATALIB.EMPS2**.
NOTE: The data set **WORK.EMPS2** has **44 observations and 4 variables.**
NOTE: The data set **WORK.NEWEMPS** has **44 observations and 4 variables.**
NOTE: The data set **WORK.EMPLOYEES** has **44 observations and 4 variables.**

Read SAS dataset from SAS dataset

There is no restriction on number of datasets to be read

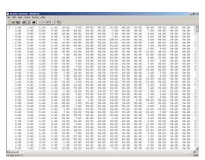
```
data emps23;
set datalib.emps2 datalib.emps3;
run;
```

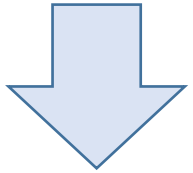
Partial log

NOTE: There were **44 observations read** from the data set **DATALIB.EMPS2.**
NOTE: There were **44 observations read** from the data set **DATALIB.EMPS3.**
NOTE: The data set **WORK.EMPS23** has **88 observations and 4 variables.**

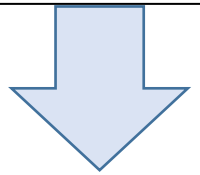
Reading external file via PROC IMPORT

Data sources to create SAS data set





```
proc import
…;
…
run;
```



Proc Import

Syntax :

```
PROC IMPORT
DATAFILE="filename" | TABLE="tablename"
OUT=<libref.>SAS data set <(SAS data set option(s))>
<DBMS=identifier>
<REPLACE>;
RUN;
```


DATAFILE : specifies the complete path and filename or fileref for the input PC file, spreadsheet, or delimited external file.
TABLE : specifies the name of the input DBMS table
OUT : identifies the output SAS data set
DBMS : specifies the type of data to import.
REPLACE : overwrites an existing SAS data set

Proc Import : reading csv file

Read Students.csv file with PROC IMPORT

```
proc import
datafile="/folders/myshortcuts/MyFolder/GL_SAS/students.csv"
      out=students
      dbms=csv
      replace;
   getnames=yes;
run;
```

Generate SAS variable names from the data values in the first row in the input file

Proc Import

Partial log :

```
NOTE: The infile '/folders/myshortcuts/MyFolder/GL_SAS/students.csv' is:
Filename=/folders/myshortcuts/MyFolder/GL_SAS/students.csv,
Owner Name=root,Group Name=root,
Access Permission=-rwxrwxrwx,
Last Modified=16Feb2015:19:23:46,
File Size (bytes)=630

NOTE: 22 records were read from the infile
'/folders/myshortcuts/MyFolder/GL_SAS/students.csv'.

The minimum record length was 24.
The maximum record length was 26.

NOTE: The data set WORK.STUDENTS has 22 observations and 5 variables.
```

Reading csv file having non standard data

Read Students1.csv file with PROC IMPORT

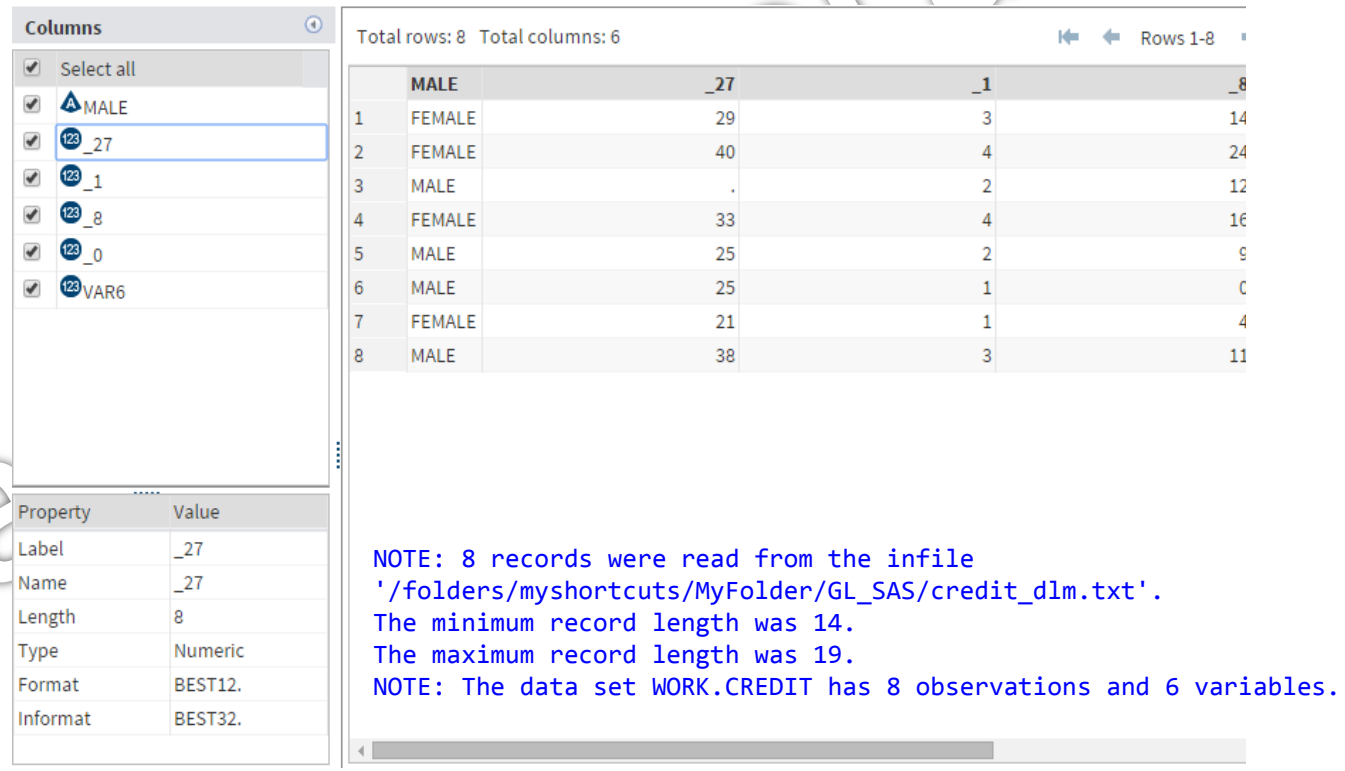
```
proc import
datafile="/folders/myshortcuts/MyFolder/GL_SAS/students1.csv"
        out=students
        dbms=csv
        replace;
    getnames=yes;
run;
```

	A	B	C	D	E	F	G
1	Obs	Name	year_of_enrollment	roll_no	subject	marks	DOB
2	1	student1	2014	101	maths1	80	20/6/1992
3	2	student2	2014	102	maths1	85	11/4/1992
4	3	student3	2014	103	maths1	84	3/3/1992
5	4	student4	2014	104	maths1	79	4/4/1992
6	5	student5	2014	105	maths1	88	19/2/1992
7	6	student6	2014	106	maths1	73	13/8/1992
8	7	student7	2014	107	maths1	85	15/9/1992
9	8	student8	2014	108	maths1	84	14/7/1992
10	9	student9	2014	109	maths1	79	2/3/1992
11	10	student10	2014	110	maths1	88	1/4/1992
12	11	student11	2014	111	maths1	73	27/2/1992
13	12	student12	2014	112	maths1	92	4/8/1992
14	13	student13	2014	113	maths1	67	19/9/1992

Reading delimited file

Read credit_dim.txt : tab delimited file

```
proc import
datafile="/folders/myshortcuts/MyFolder/GL_SAS/credit_dlm.txt"
        out=credit
        dbms=dlm
        replace;
 delimiter= '09'x;
    getnames=yes;
run;
```



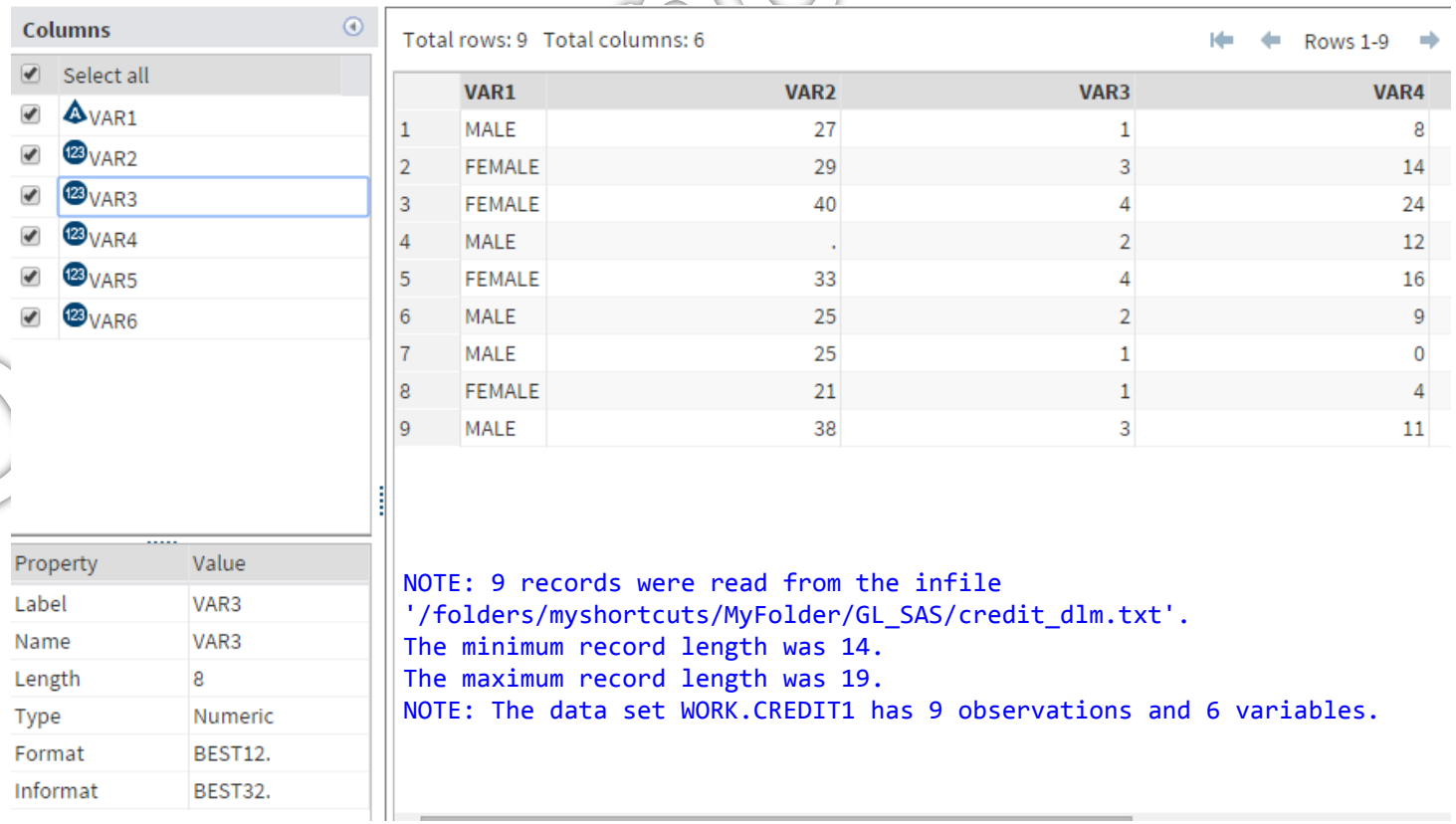
On an ASCII platform, the hexadecimal representation of a tab is '09'x.
On an EBCDIC platform, the hexadecimal representation of a tab is a'05'x.

Reading delimited file

Read credit_dim.txt : tab delimited file

```
MALE      27   1    8    0    0
FEMALE    29   3    14   5    10
FEMALE    40   4    24   4    15
MALE           2    12   4    8
FEMALE    33   4    16   3    7
MALE      25   2    9    0    0
MALE      25   1    0    0    0
FEMALE    21   1    4    2    6
MALE       38  3    11   4    3
```

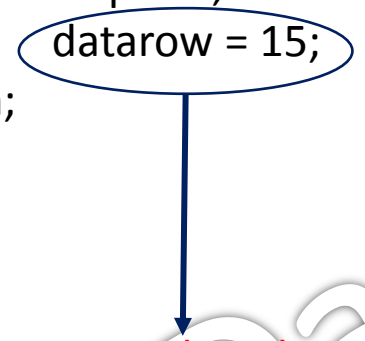
```
proc import
datafile="/folders/myshortcuts/MyFolder/GL_SAS/credit_dlm.txt"
        out=credit1
        dbms=dlm
        replace;
 delimiter= '09'x;
    getnames=no;
run;
```



Reading XLSX

Read students1.xlsx file

```
proc import datafile="/folders/myshortcuts/MyFolder/GL_SAS/students1.xlsx"
        dbms=XLSX
        out=students1x
        replace;
     datarow = 15;
run;
```



Start reading data from a specific row in the delimited text file

```
NOTE: The import data set has 22 observations
and 7 variables.
```

```
NOTE: The import data set has 9 observations and 7 variables
```

Proc Import

Advantages :

- Easy to use
- Quick

Disadvantages :

- We can not drop or rearrange some variables.
- PROC IMPORT may not properly assign attributes such as the variables length and format.

Assignments

1.Read Productsales.xlsx file in SAS.

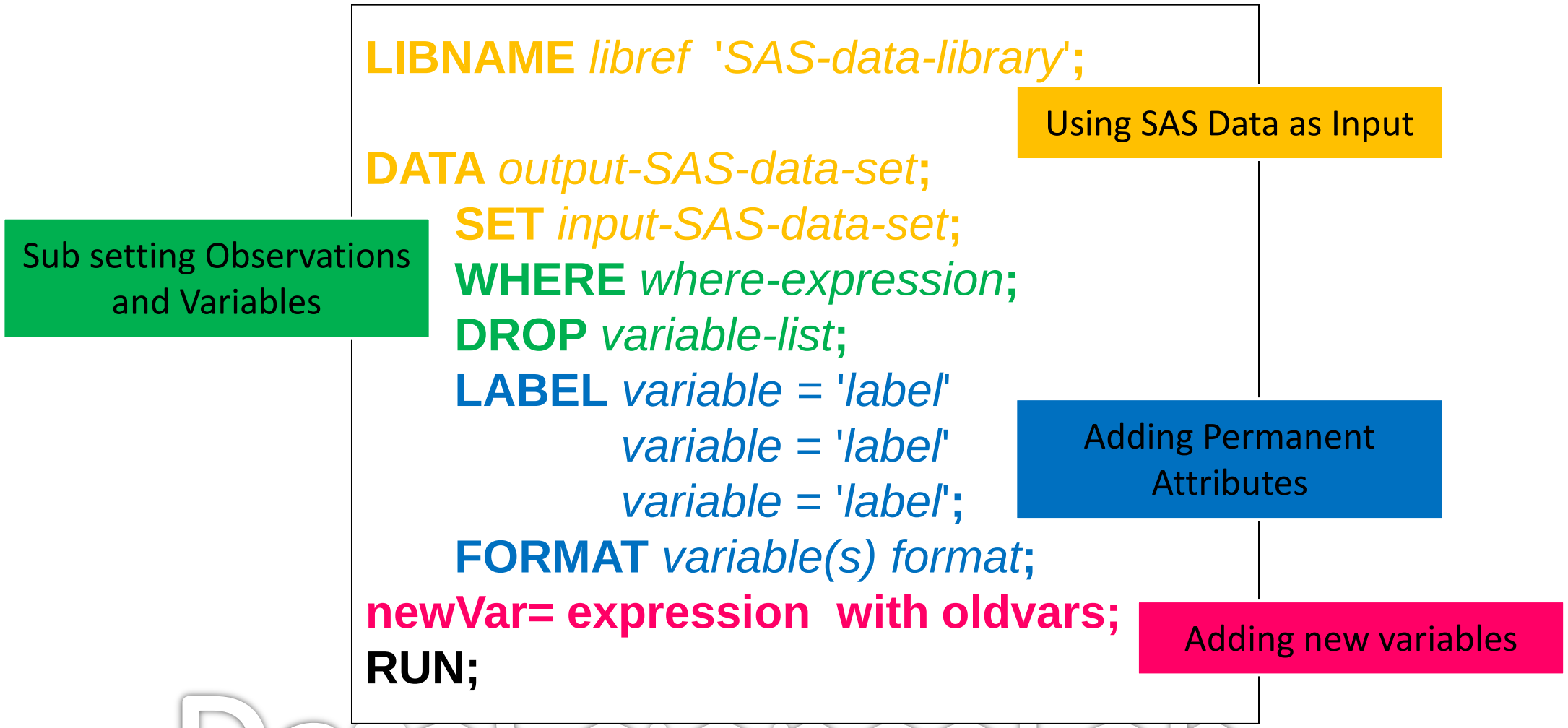
2.Read sashelp.stocks in work library as new dataset stocks_analysis.

Managing and manipulating data

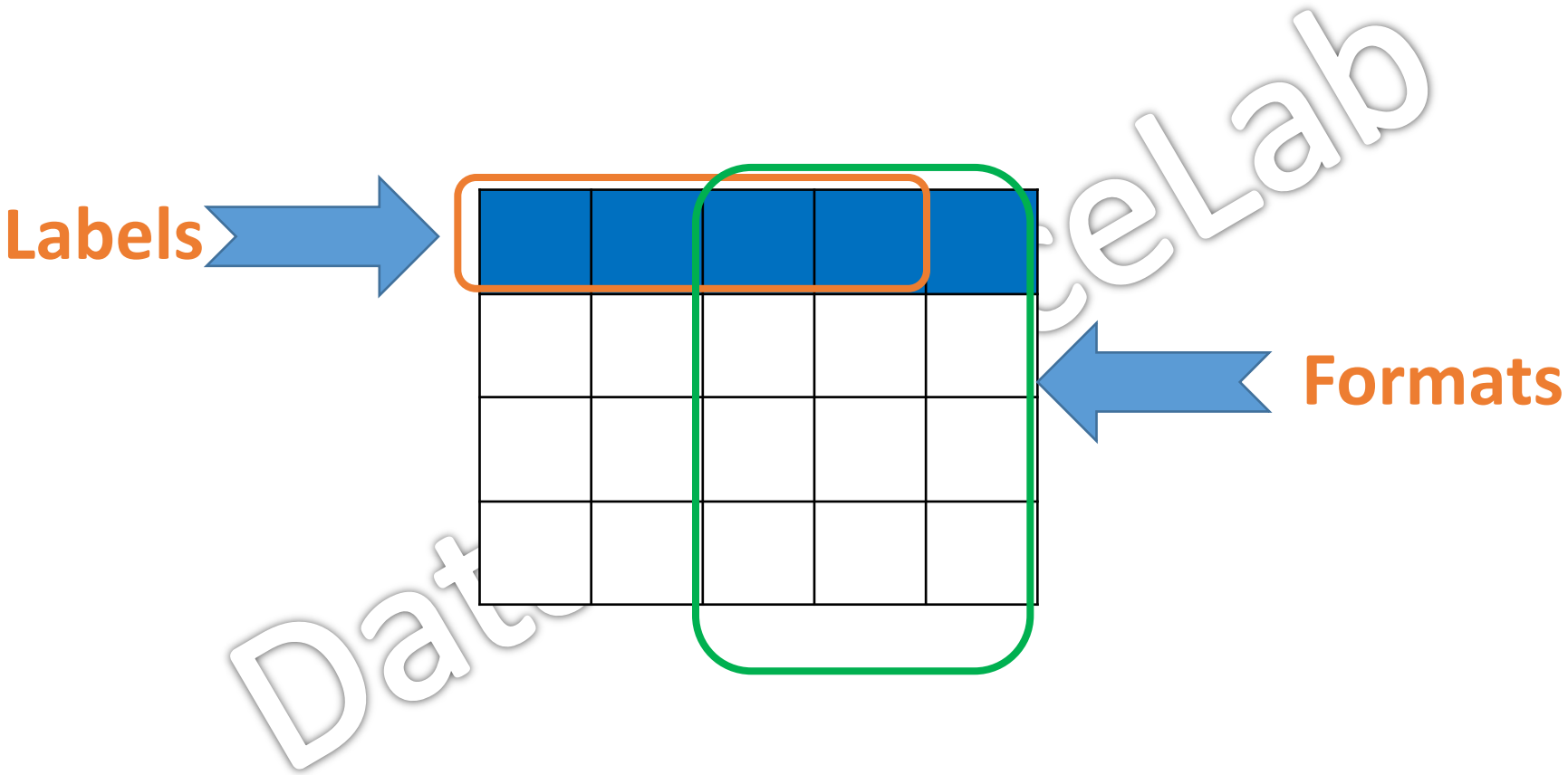
Outline

- Add permanent attributes to the data
- Add new variables
- Subset observations and variables

Creating SAS data set



Adding Permanent Attributes



Read SAS dataset from SAS dataset

```
data air;
set sashelp.air;
run;
```


DATE	AIR
JAN49	112
FEB49	118
MAR49	132
APR49	129
MAY49	121

Partial data set

Partial log

NOTE: There were 144 observations read from the data set SASHELP.AIR.

NOTE: The data set WORK.AIR has 144 observations and 2 variables.

Adding Labels

Employee ID	Employee Full Name	Birth Date	Date Of Joining	SALARY

The LABEL Statement

Change the look of variable name by defining label- a description.

Syntax :

LABEL *variable* = '*label*'
variable = '*label*'
variable = '*label*';

- The LABEL statement assigns descriptive labels to variable names.
- A label can be up to 256 characters.
- Any number of variables can be associated with labels in a single LABEL statement.

Permanent labels and temporary labels

Permanent label :

- When assigned in a data step becomes a part of descriptor portion of a data set
- To override: Reassign in data step or assign in proc step

Example:

```
data work.air;    /* assign label*/
set sashelp.air;
label date='Month Of Flying';
run;

Proc contents data=air;    /* chk descriptor*/
 run;


 proc print data=air label;  /* use perm label*/
 run;
```

Permanent labels and temporary labels

Temporary label :

- When assigned in a proc step it is used only for that step
- Some Proc steps use labels automatically , while some requires exclusive instructions

Example :

```
/*exclusive instructions*/
proc print data=air label;   /*label option */
label date='Flying Month'   air ='Air miles Travelled';    /*label statement */
run;

/*automatic use of labels*/
proc means data=air;
run;
```

Adding Formats

Employee ID	Employee Full Name	Birth Date	Date Of Joining	SALARY
		09Jul1975	30Apr2004	$25,000
		4Jul1967	29Jun1999	$50,000
		07Sep1944	17Aug1973	$35,000

The FORMAT Statement

Change the look of variable name by defining label- a description.

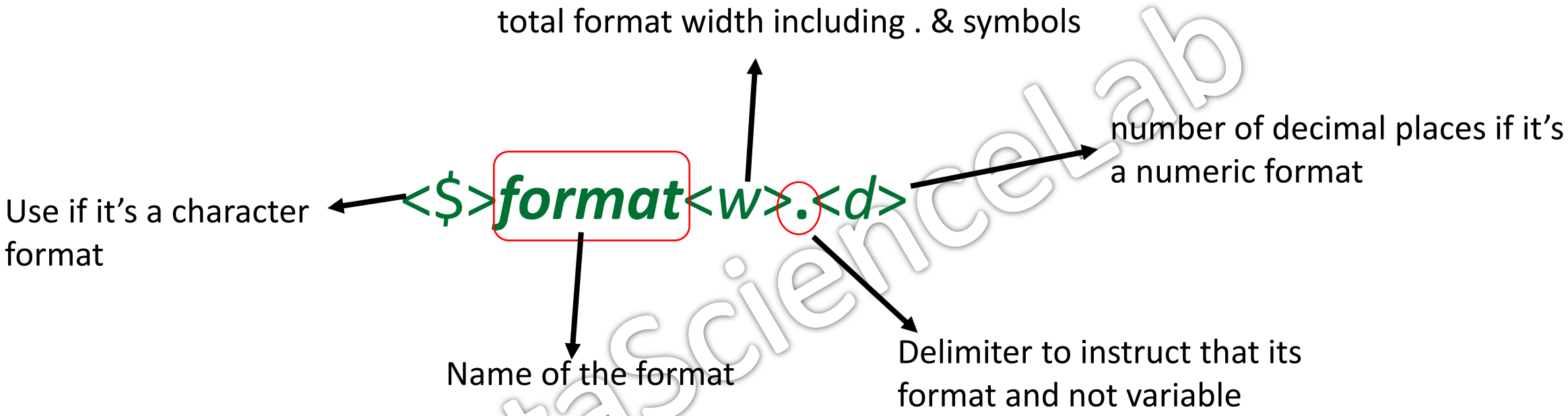
Syntax :

FORMAT *variable(s) format* **;**

- The *FORMAT statement* assigns formats to variable values.
- A *format* is an instruction that SAS uses to write data values.
- Permanent formats are assigned in data step and temporary formats are defined in the proc steps
- Format statement can assign both, system defined and user defined formats.

Format notation

Notation syntax:



Examples:

SASProgrammingClass ➔ $4.➔SASP

16191➔dollar10.2 ➔ $16,191.00 OR 5.➔ 16191 OR eurox9.1➔ € 16.191,00

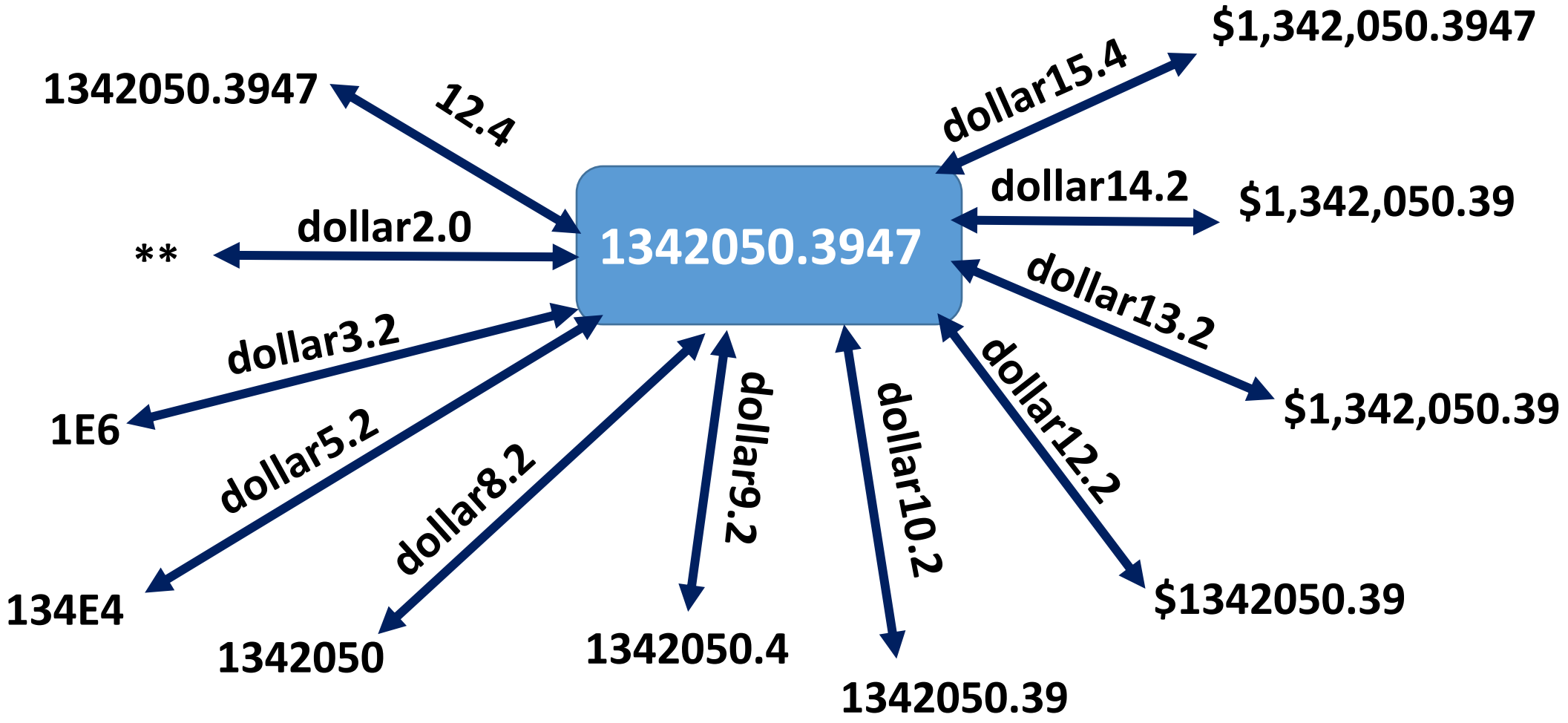
16191➔date9. ➔ 30 APR2004

Some generic forms of SAS formats

Format	Definition
$*w*.	Writes standard character data
w.*d*	Writes standard numeric data
COMMA*w*.*d*	Writes numeric values with a comma that separates every three digits and a period that separates the decimal fraction
COMMAX*w*.*d*	Writes numeric values with a period that separates every three digits and a comma that separates the decimal fraction
DOLLAR*w*.*d*	Writes numeric values with a leading dollar sign, a comma that separates every three digits, and a period that separates the decimal fraction
EUROX*w*.*d*	Writes numeric values with a leading euro symbol (€), a period that separates every three digits, and a comma that separates the decimal fraction

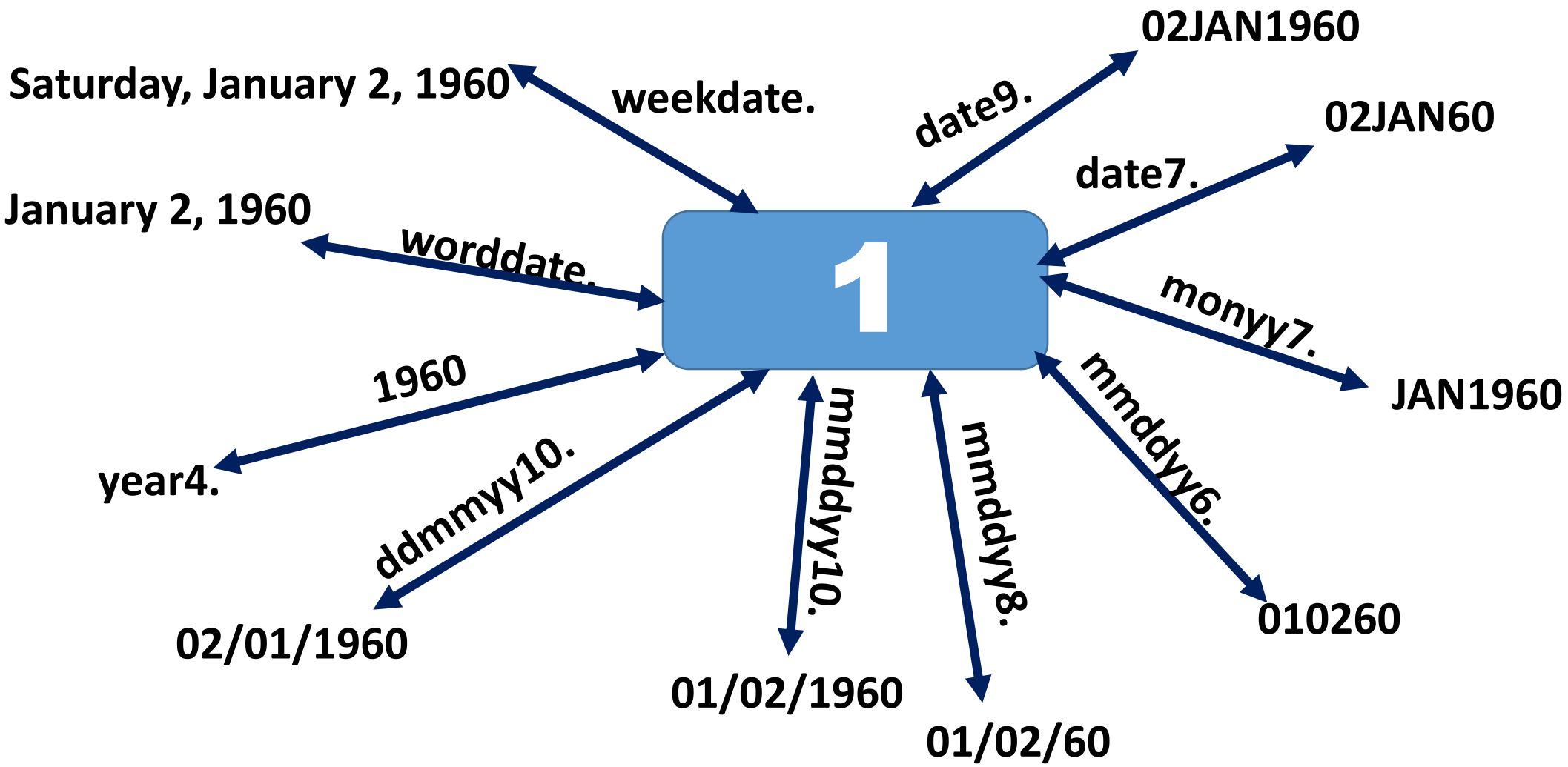
Format width for numbers

- Format width should be appropriate
- If it’s not, SAS will try to display approximately correct value, as far as possible



Formats for date

- SAS stores date as number of days calculated from 1st Jan. 1960
- So the value stored is ‘0’ for 1st Jan. 1960



SAS Format

Formats are used automatically.

Step1: Make permanent format

```
data work.air;
set sashelp.air;
format date year.;
run;
```

Step2: Check descriptor

```
Proc contents data=air;
run;
```

#	Variable	Type	Len	Format
2	AIR	Num	8	
1	DATE	Num	8	YEAR.

Step3 :Print the data

```
proc print data=air;
run;
```

Obs	DATE	AIR
1	1949	112
2	1949	118
3	1949	132
4	1949	129
5	1949	121
6	1949	135
7	1949	148
8	1949	148
9	1949	136
10	1949	119

Override and Print the data

```
proc print data=air;
format date date9.;
run;
```

Obs	DATE	AIR
1	01JAN1949	112
2	01FEB1949	118
3	01MAR1949	132
4	01APR1949	129
5	01MAY1949	121
6	01JUN1949	135
7	01JUL1949	148
8	01AUG1949	148

Assignment1

- Print data set sashelp.failure and notice the in built format for the variable ‘DAY’.
- Use weekdate. Format while printing the sashelp.failure data set for the ‘DAY’ variable.
- What is the difference you find in the output ?

Assignment2

- Print first 10 observations from the data set sashelp.failure
- Notice if there is any label.
- Apply the label option and print again (only first 10 observations) and notice if any change
- Now apply label “Failure due to” for the variable CAUSE and notice that it is applied.

Creating new variables

Task : Create new variables in the data set

HR department need to declare bonus for all employees . Bonus would be given on their work anniversary:

Create a new variable for following tasks :

- Bonus — Do arithmetic operation
- Full_name — By concatenating FNAME and LNAME
- Anniversary month of an employee — Use function
- Flag for Employees with job title “manager” — Use function

Update variables by rounding off their values:

age and serviceyrs — Use function

Creating a new variable in the data set

```
data emps;
set datalib.emps;
bonus = salary * 0.1;
run;
```

Alien variable ➔ 'newly created variable'

Task : Check the log and the output dataset . What type of the bonus variable is created? Why is so?

Bonus will be created as numeric in this case because it was result of multiplication i.e. arithmetic calculation.

The new variable is defined as numeric is – if it is assign directly to a numeric variable or value, or is a result of arithmetic calculation or function that results in number.

On the same way, it would have been character -if it is assign directly to a character variable or a string , or is a result of character operator or function that results in string/character.

Creating new variables in the data set

```
data emps;
set datalib.emps;
bonus = salary * 0.1;
Full_name=FNAME||" "|| LNAME;
annivmonth=month(HIRE_DATE);
if find(Upcase(job_title),"MANAGER")>0 then Flag_M=1;
else Flag_M=0 ;
Age=round(age);
Serviceyrs=round(serviceyrs);
run;
```


Variable	Type	Len
Full_name	Char	52
annivmonth	Num	8
Flag_M	Num	8

Full_name	annivmonth	Flag_M
First101 LAST101	10	1
First102 LAST102	10	0
First103 LAST103	11	0
First104 LAST104	6	0
First105 LAST105	8	0
First106 LAST106	5	0
First107 LAST107	6	0
First108 LAST108	7	0
First109 LAST109	9	0
First110 LAST110	10	0
First111 LAST111	10	0
First112 LAST112	12	0
First113 LAST113	10	1
First114 LAST114	6	1
First115 LAST115	11	1
First116 LAST116	1	1
First117 LAST117	2	1
First118 LAST118	7	1
First119 LAST119	8	1
First120 LAST120	1	1
First121 LAST121	7	0

Creating new variables in the data set

```
data emps;
set datalib.emps;
bonus = salary * 0.1;
Full_name=FNAME||"  "|| LNAME;
annivmonth=month(HIRE_DATE);
if scan(Upcase(job_title),-1)= "MANAGER" then Flag_M=1;
else Flag_M=0 ;
Age=round(age);
Serviceyrs=round(serviceyrs);
run;
```


Variable	Type	Len
Full_name	Char	52
annivmonth	Num	8
Flag_M	Num	8

Full_name	annivmonth	Flag_M
First101 LAST101	10	1
First102 LAST102	10	0
First103 LAST103	11	0
First104 LAST104	6	0
First105 LAST105	8	0
First106 LAST106	5	0
First107 LAST107	6	0
First108 LAST108	7	0
First109 LAST109	9	0
First110 LAST110	10	0
First111 LAST111	10	0
First112 LAST112	12	0
First113 LAST113	10	1
First114 LAST114	6	1
First115 LAST115	11	1
First116 LAST116	1	1
First117 LAST117	2	1
First118 LAST118	7	1
First119 LAST119	8	1
First120 LAST120	1	1
First121 LAST121	7	0

Accumulation using The SUM statement

```
data Jan2014;
set datalib.fish_oil_daily;
Totalvalue+value;
run;
proc print data=Jan2014;
run;
```

The SUM statement :

- ✓ It initialized the variable, Totalvalue to zero
- ✓ The value of Totalvalue is automatically retained
- ✓ Totalvalue is increased by the value of Value for each observation
- ✓ The sum statement ignores missing values of Value

Assignments

Read sashelp.stocks in work library as new dataset stocks_analysis.
(already created in last section)

—The data set should have following new variables price_low, price_high, price_adjclose using relevant rates and volume.

—Drop open and close rates before the calculations

—Drop low, high and adjclose rates from the output

—Subset the data if the volume is greater than 10,000,000

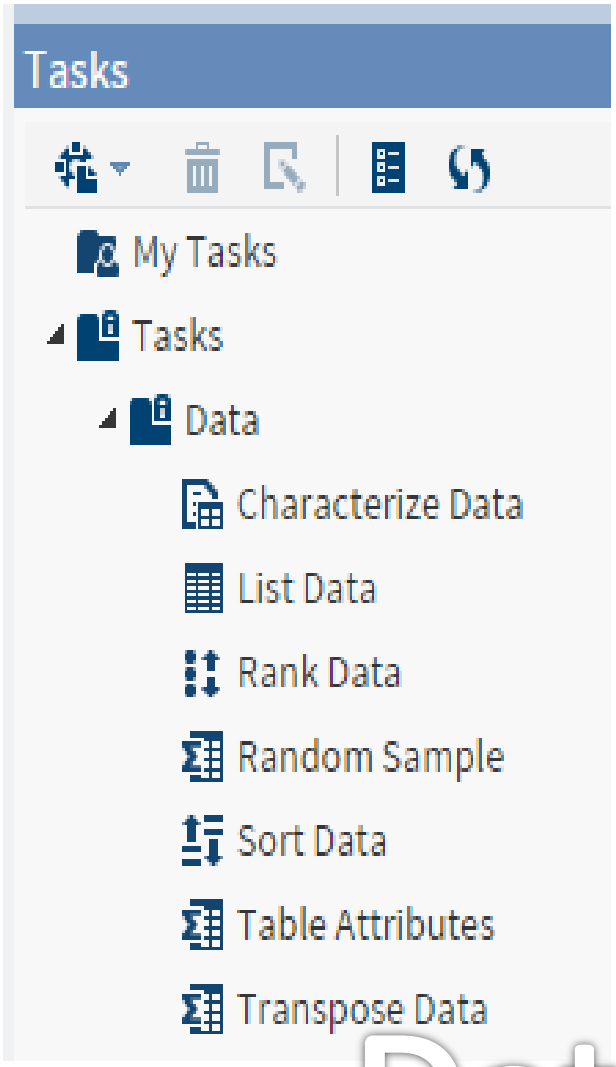
—The output should contain only if the price_adjclose to be greater than 280,000,000

Data Exploration , Validation and Analysis

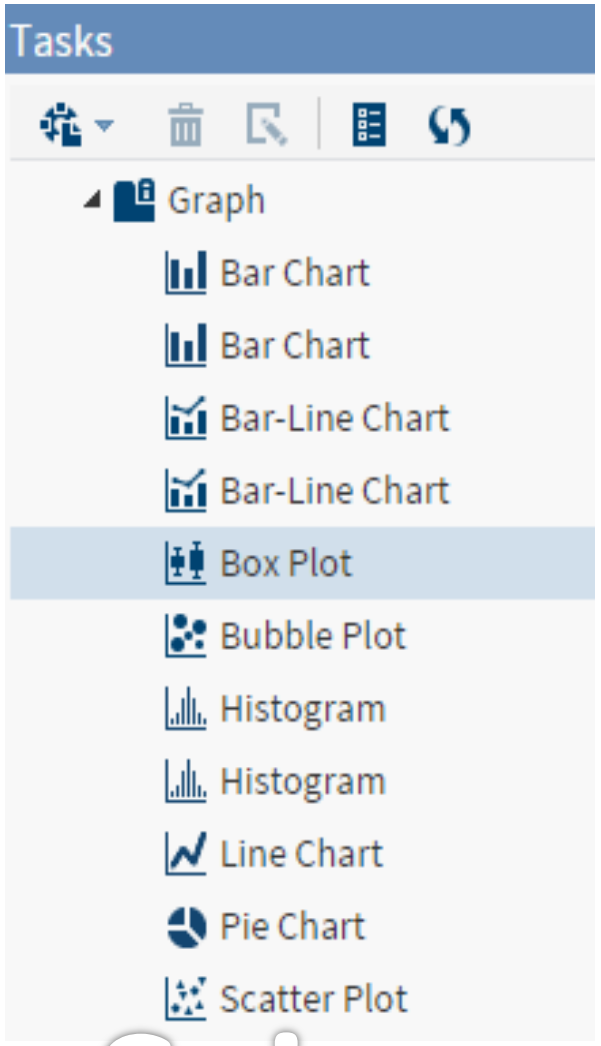
Point and click tasks through SAS Studio

List of Tasks

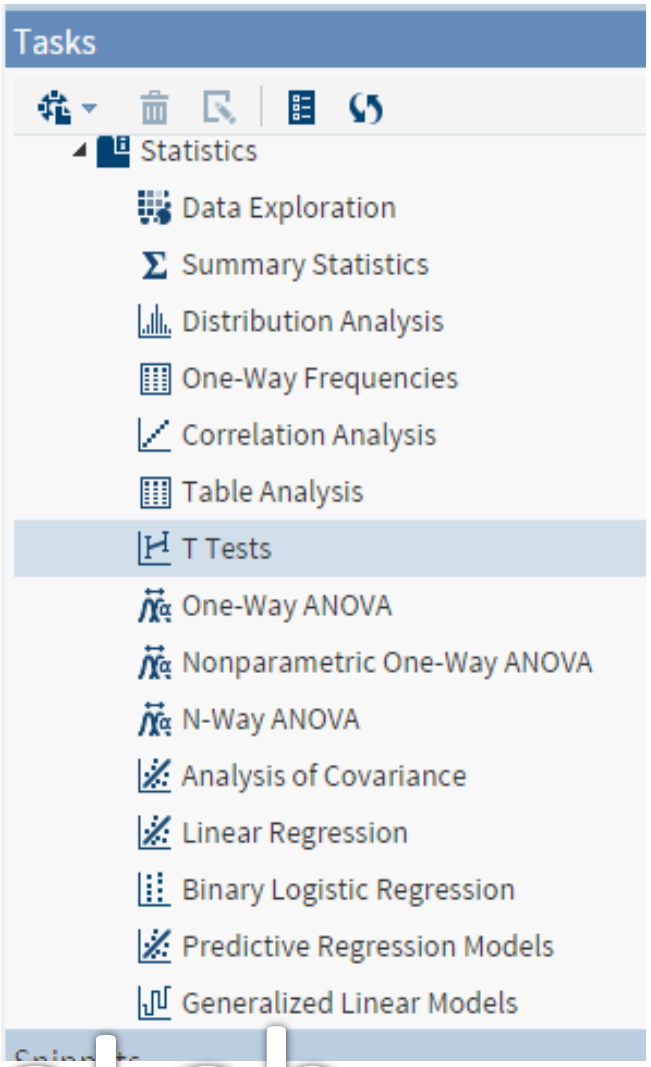
DATA



GRAPH

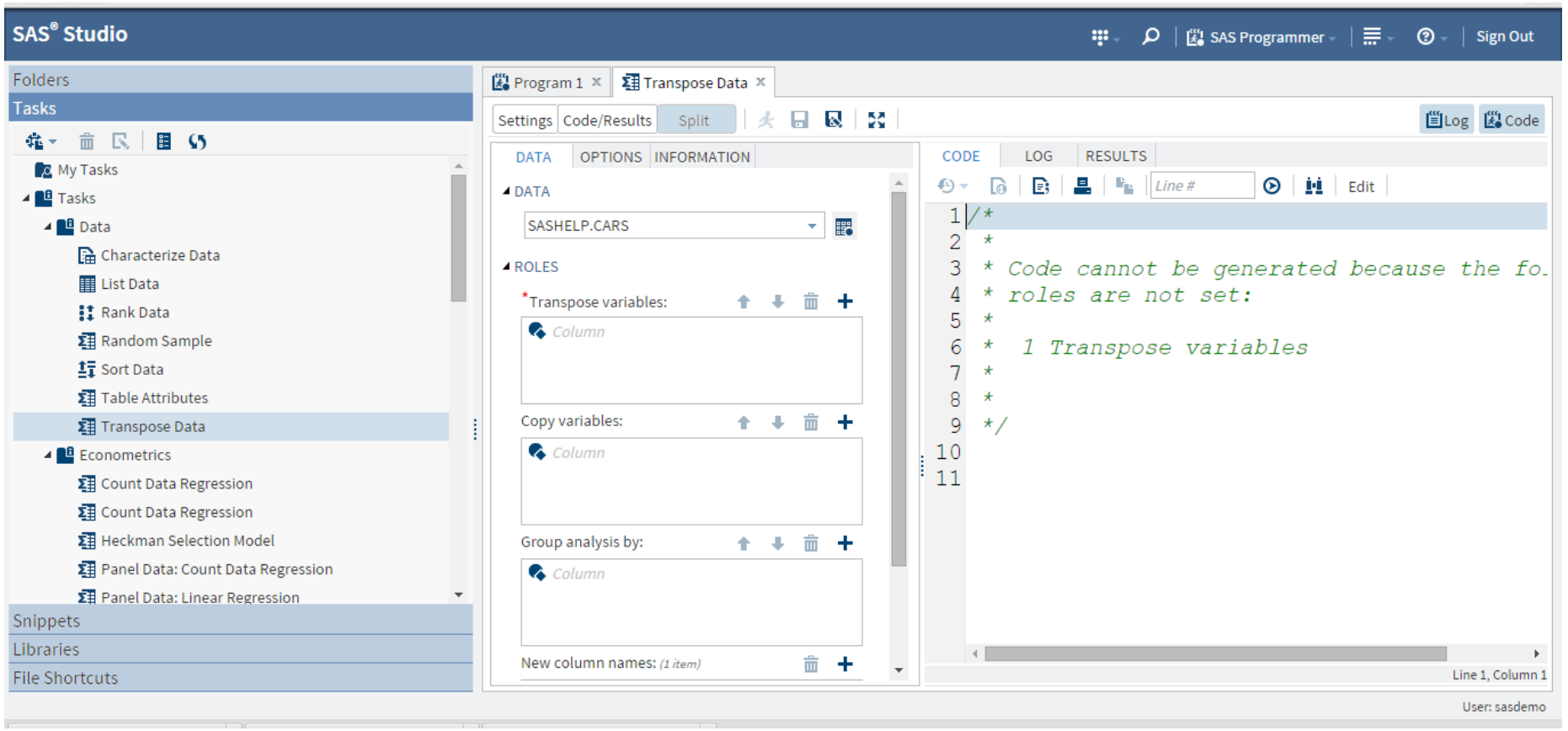


STATISTICS



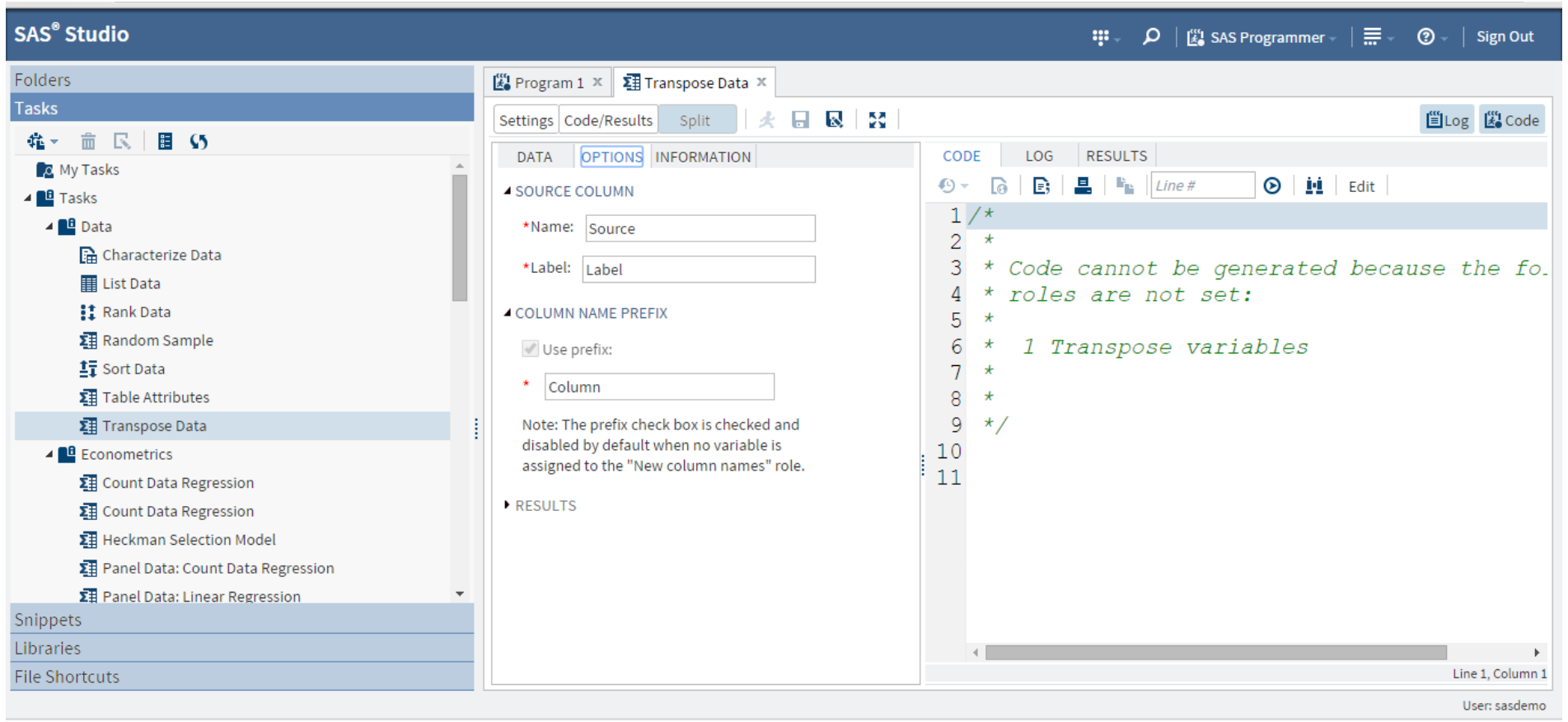
Data Tasks

TRANSPOSE DATA : Task



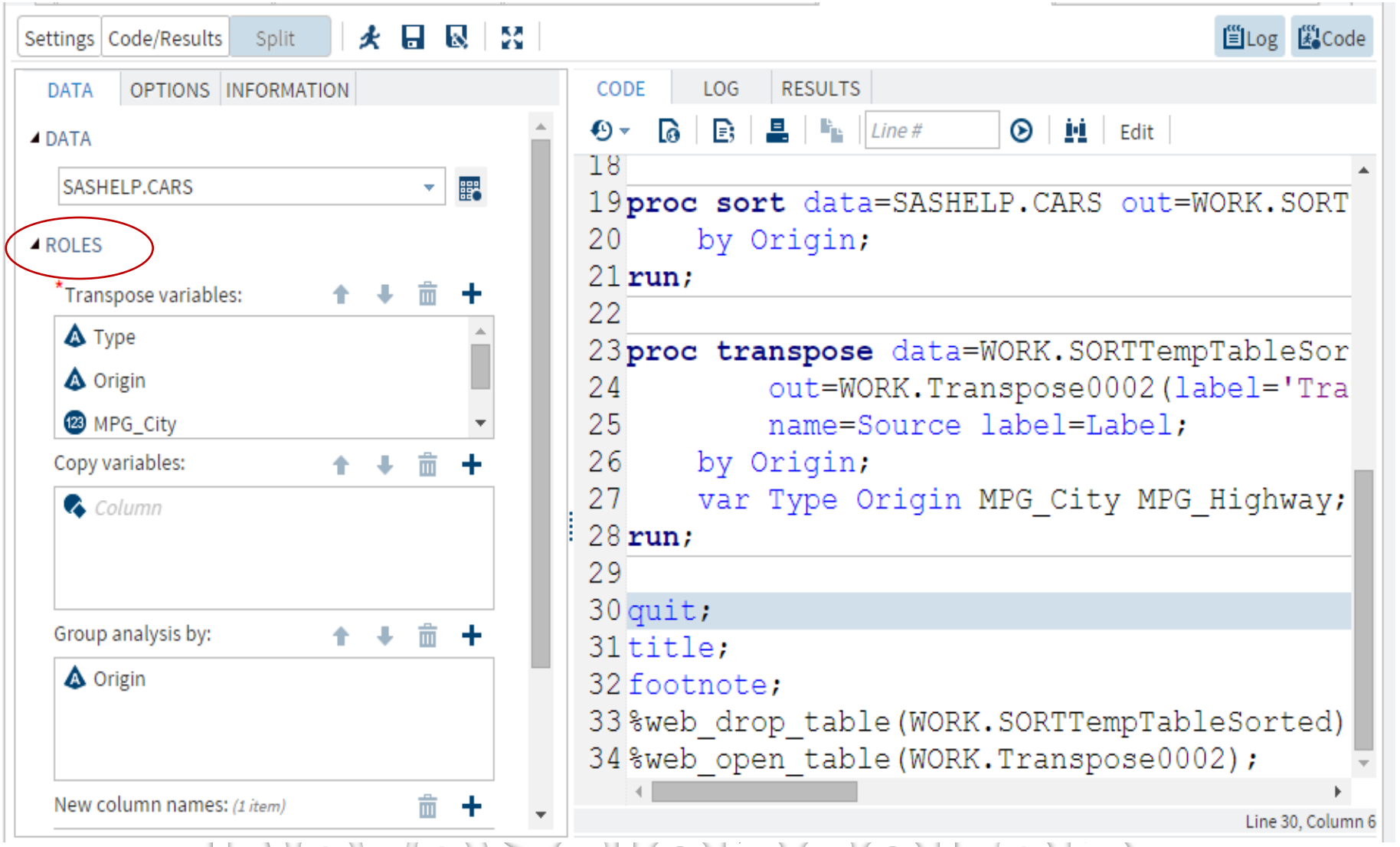
DataScienceLab

TRANSPOSE DATA : Options



DataScienceLab

TRANSPOSE DATA : Task



TRANSPOSE DATA : Results

Total rows: 12 Total columns: 161 Rows 1-12

	Origin	Source	Label	Column1	Colum
1	Asia	Type		SUV	Sedan
2	Asia	Origin		Asia	Asia
3	Asia	MPG_City	MPG (City)	17	24
4	Asia	MPG_Highway	MPG (Highway)	23	31
5	Europe	Type		Sedan	Sedan
6	Europe	Origin		Europe	Europe
7	Europe	MPG_City	MPG (City)	22	23
8	Europe	MPG_Highway	MPG (Highway)	31	30
9	USA	Type		SUV	SUV
10	USA	Origin		USA	USA
11	USA	MPG_City	MPG (City)	15	19
12	USA	MPG_Highway	MPG (Highway)	21	26

Assignment1

Create a new dataset work.sort by using datalib.emps and sort the data by gender within department

Assignment2

1) Randomly select 1000 sample from sashelp.heart by using seed value as 26542 .
2) Do stratified sampling of origin variable from sashelp.cars.

Assignment3

Restructure the data sashelp.class

Data Exploration

Data Set Name	SASHELP.CARS	Observations	428
Member Type	DATA	Variables	15
Engine	V9	Indexes	0
Created	12/06/2013 20:09:53	Observation Length	152
Last Modified	12/06/2013 20:09:53	Deleted Observations	0
Protection		Compressed	NO
Data Set Type		Sorted	YES
Label	2004 Car Data		
Data Representation	SOLARIS_X86_64, LINUX_X86_64, ALPHA_TRU64, LINUX_IA64		
Encoding	us-ascii ASCII (ANSI)		

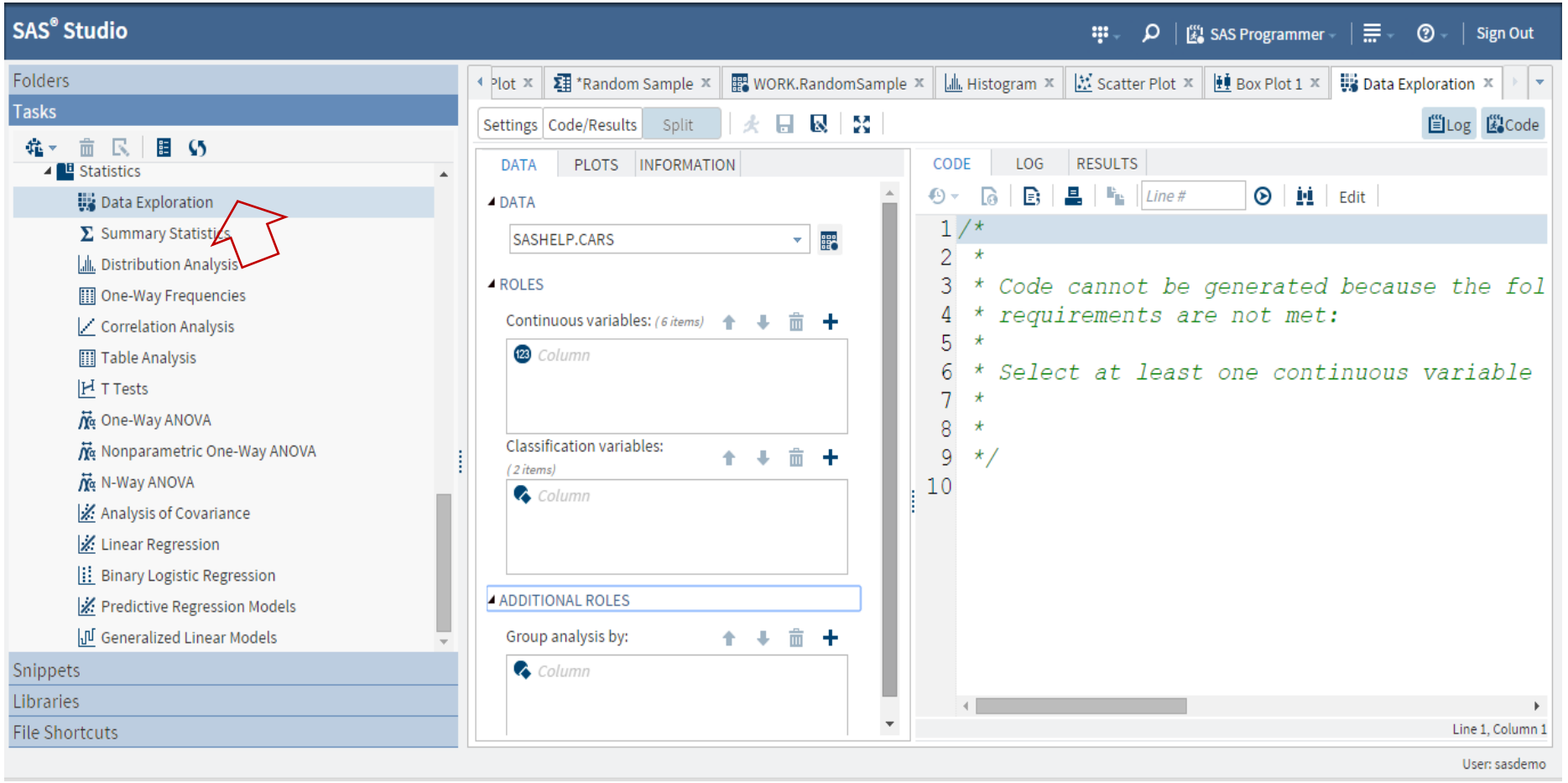
Obs	Make	Model	Type	Origin	DriveTrain	MSRP	Invoice	EngineSize
1	Acura	MDX	SUV	Asia	All	$36,945	$33,337	3.5
2	Acura	RSX Type S 2dr	Sedan	Asia	Front	$23,820	$21,761	2.0
3	Acura	TSX 4dr	Sedan	Asia	Front	$26,990	$24,647	2.4
4	Acura	TL 4dr	Sedan	Asia	Front	$33,195	$30,299	3.2
5	Acura	3.5 RL 4dr	Sedan	Asia	Front	$43,755	$39,014	3.5

Data Exploration

Alphabetic List of Variables and Attributes					
#	Variable	Type	Len	Format	Label
9	Cylinders	Num	8		
5	DriveTrain	Char	5		
8	EngineSize	Num	8		Engine Size (L)
10	Horsepower	Num	8		
7	Invoice	Num	8	DOLLAR8.	
15	Length	Num	8		Length (IN)
11	MPG_City	Num	8		MPG (City)
12	MPG_Highway	Num	8		MPG (Highway)
6	MSRP	Num	8	DOLLAR8.	
1	Make	Char	13		
2	Model	Char	40		
4	Origin	Char	6		

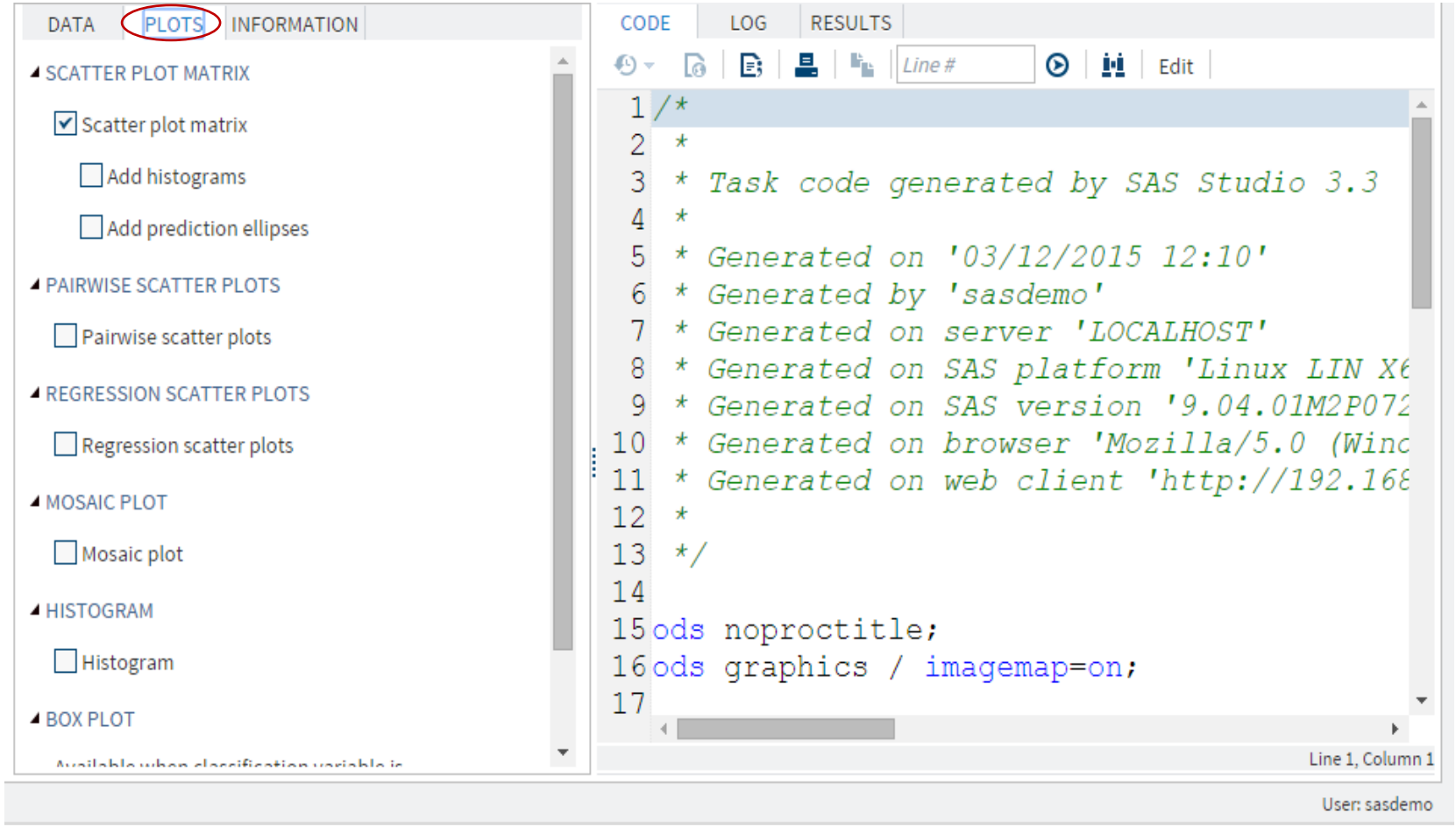
Alphabetic List of Variables and Attributes					
#	Variable	Type	Len	Format	Label
3	Type	Char	8		
13	Weight	Num	8		Weight (LBS)
14	Wheelbase	Num	8		Wheelbase (IN)

Data Exploration: Task

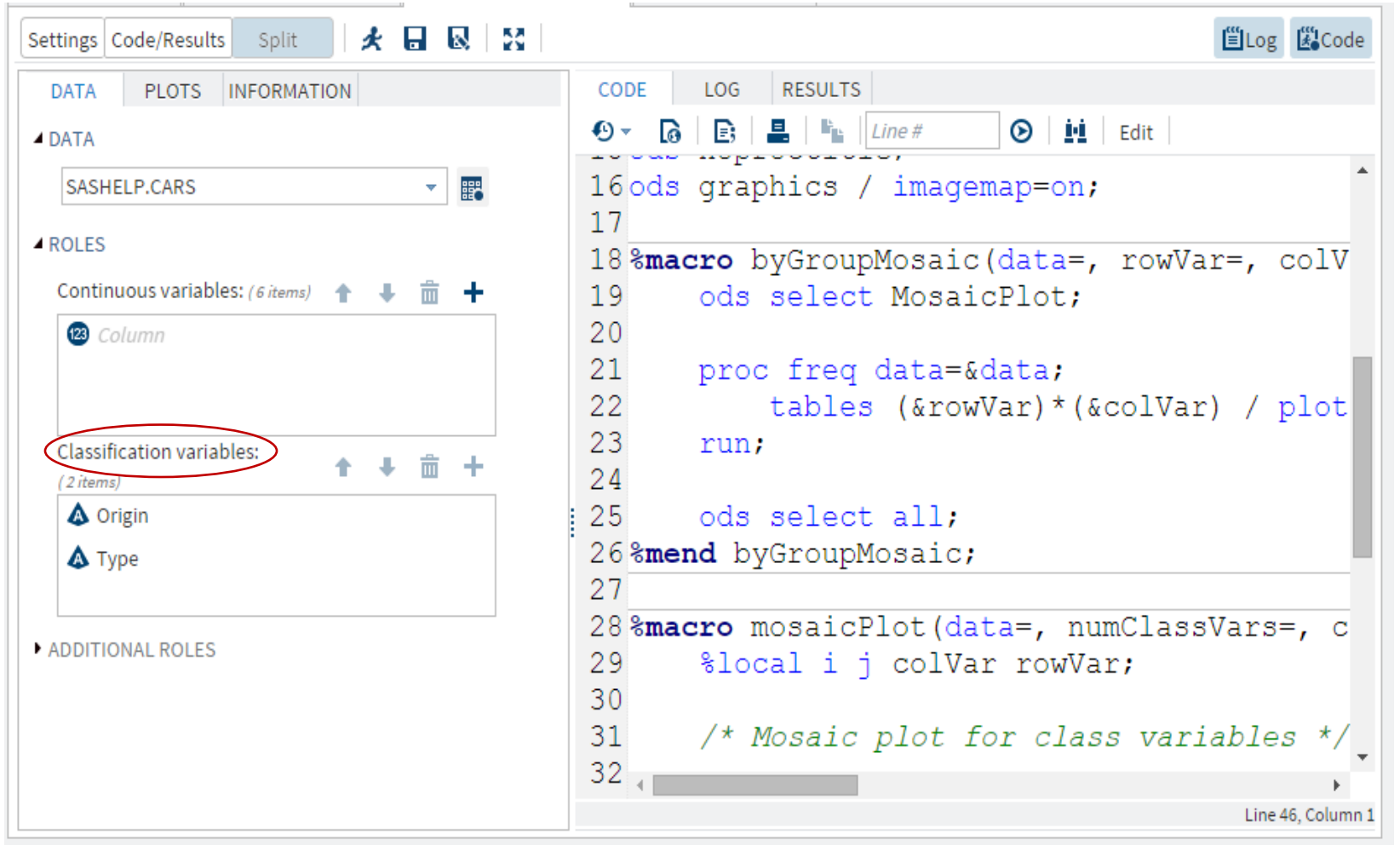


DataScienceLab

Data Exploration: Plots

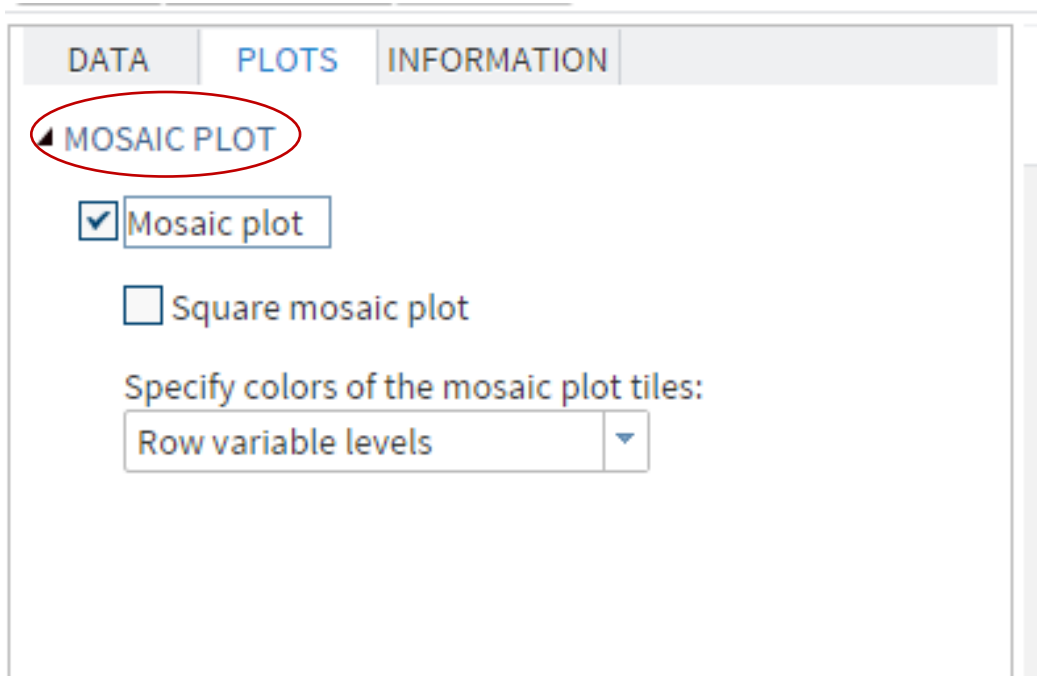


Data Exploration: Selecting Variables

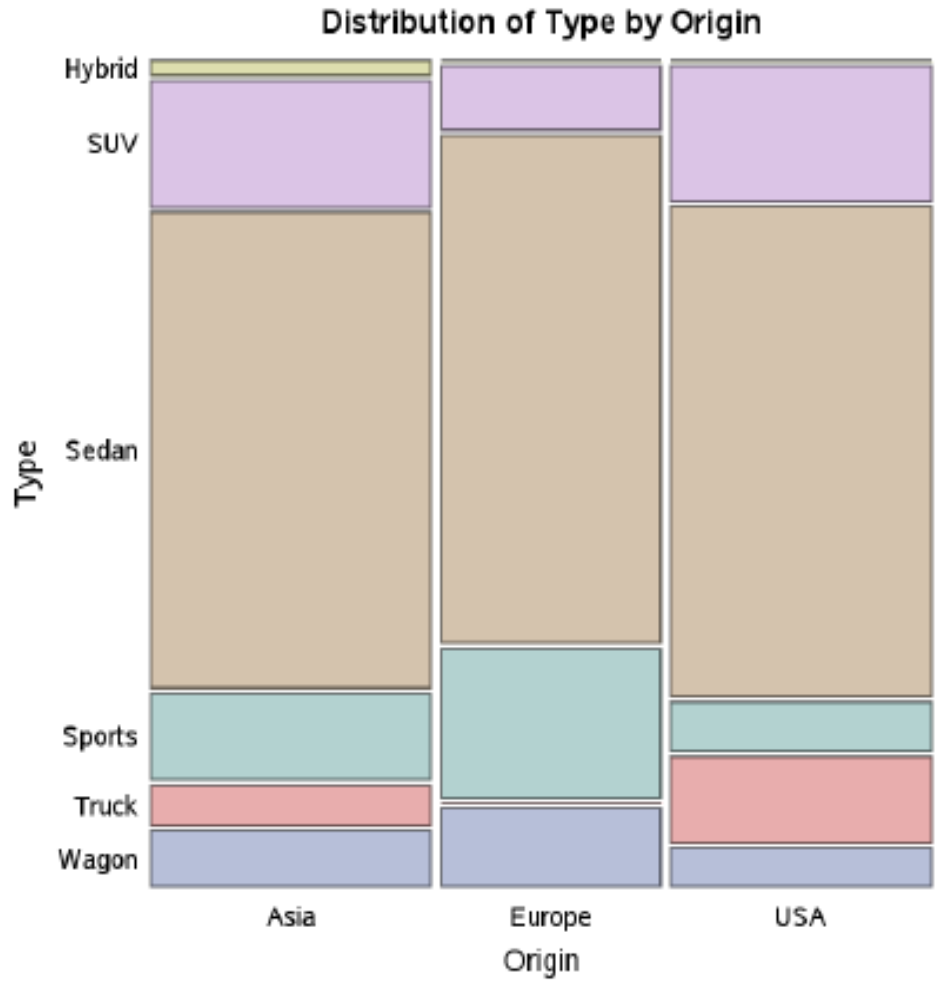


DataScienceLab

Data Exploration: Plots



Data Exploration: Results



In mosaic plot we compare, two categorical variables here, type and origin.

From the plot , it looks like, Asia region has more sedan cars than Europe and USA .

Whereas Europe makes more Sports cars than Asia and USA and less SUV than other regions.

Statistical Tasks

Correlation

- Correlation can tell you something about the relationship between variables.

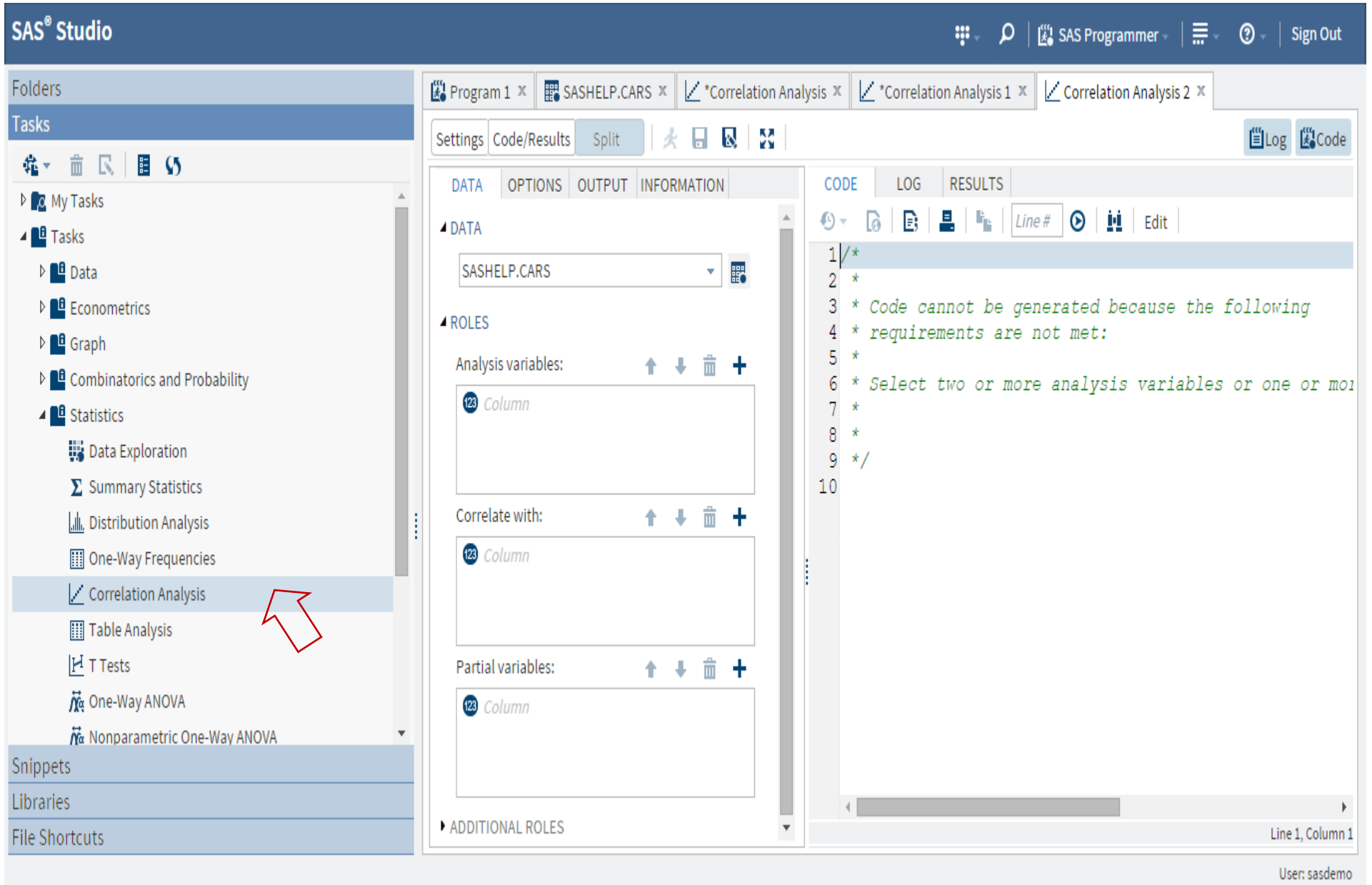
It is used to understand:

- whether the relationship is positive or negative
- the strength of relationship.
- Statistical correlation is measured by what is called coefficient of correlation (r).
- Its numerical value ranges from +1.0 to -1.0. It gives us an indication of the strength of relationship.

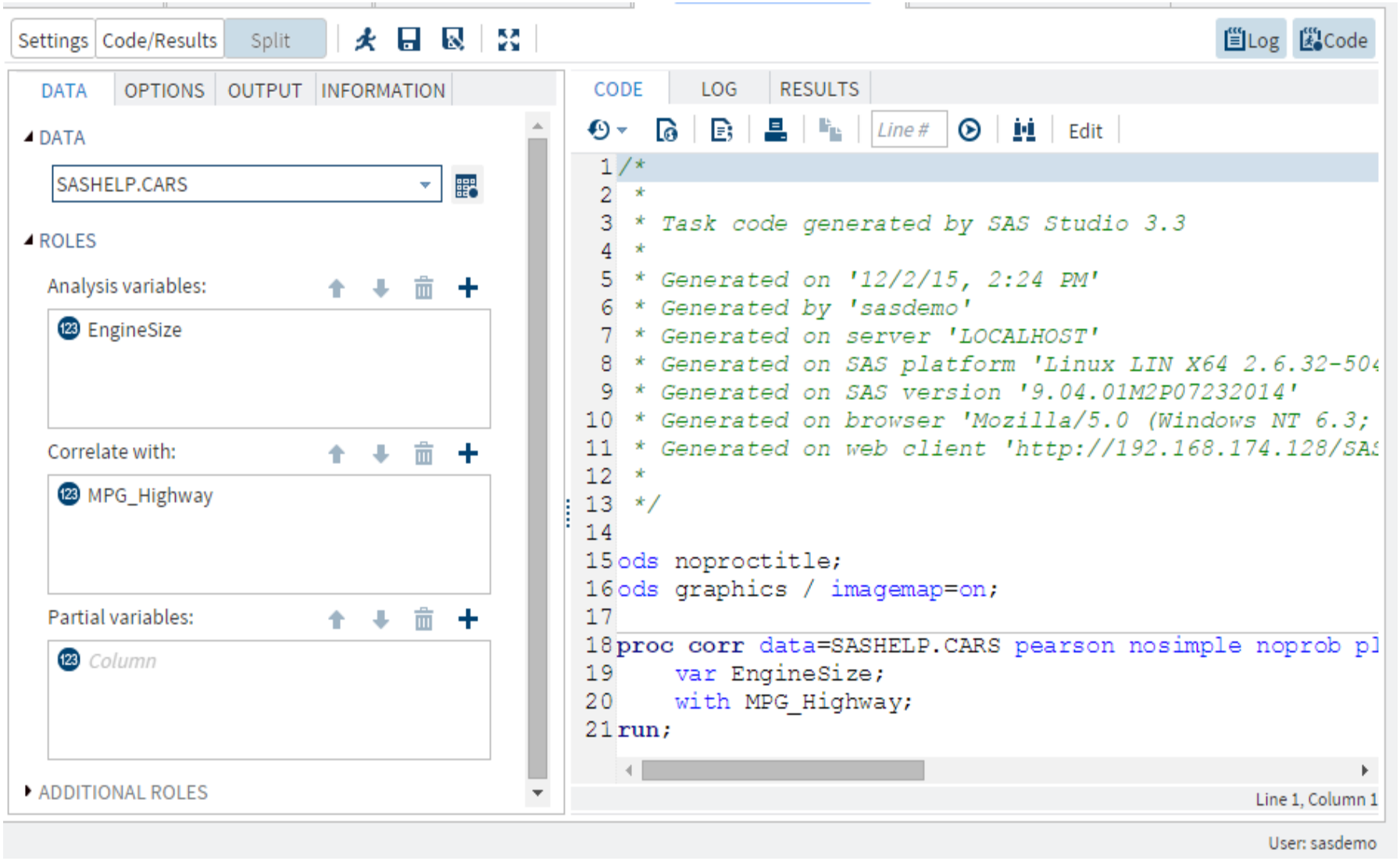
Task

Find out correlation between EngineSize & MPG_Highway using sashelp.cars dataset.

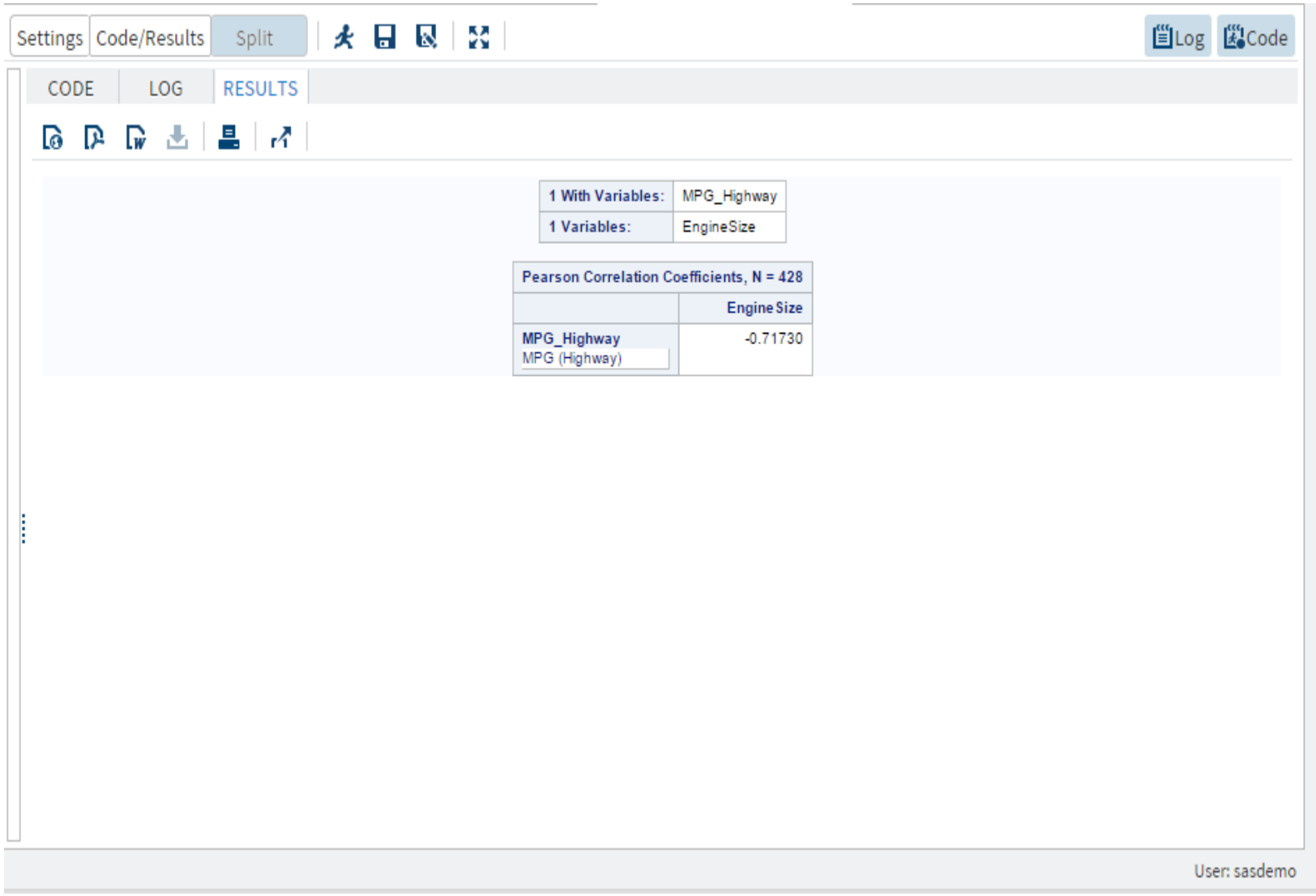
Correlation



Correlation



Correlation : Result



Linear Regression

In statistics, linear regression is an approach for modelling the relationship between a scalar dependent variable y and one or more explanatory variables (or independent variables) denoted X. The case of one explanatory variable is called simple linear regression.

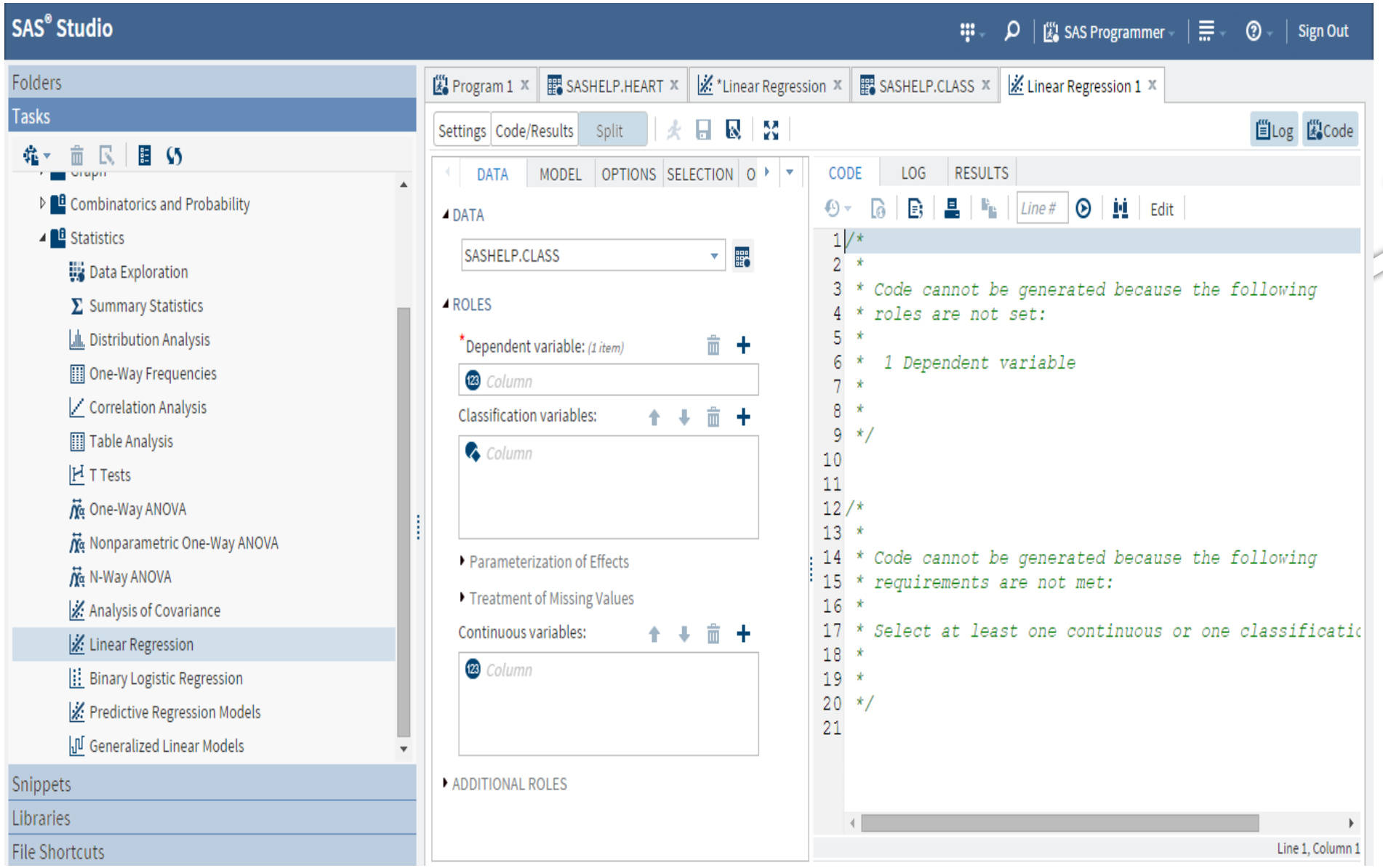
Linear Regression Model :

$Y_i = \beta_0 + \beta_1 + \varepsilon_i$

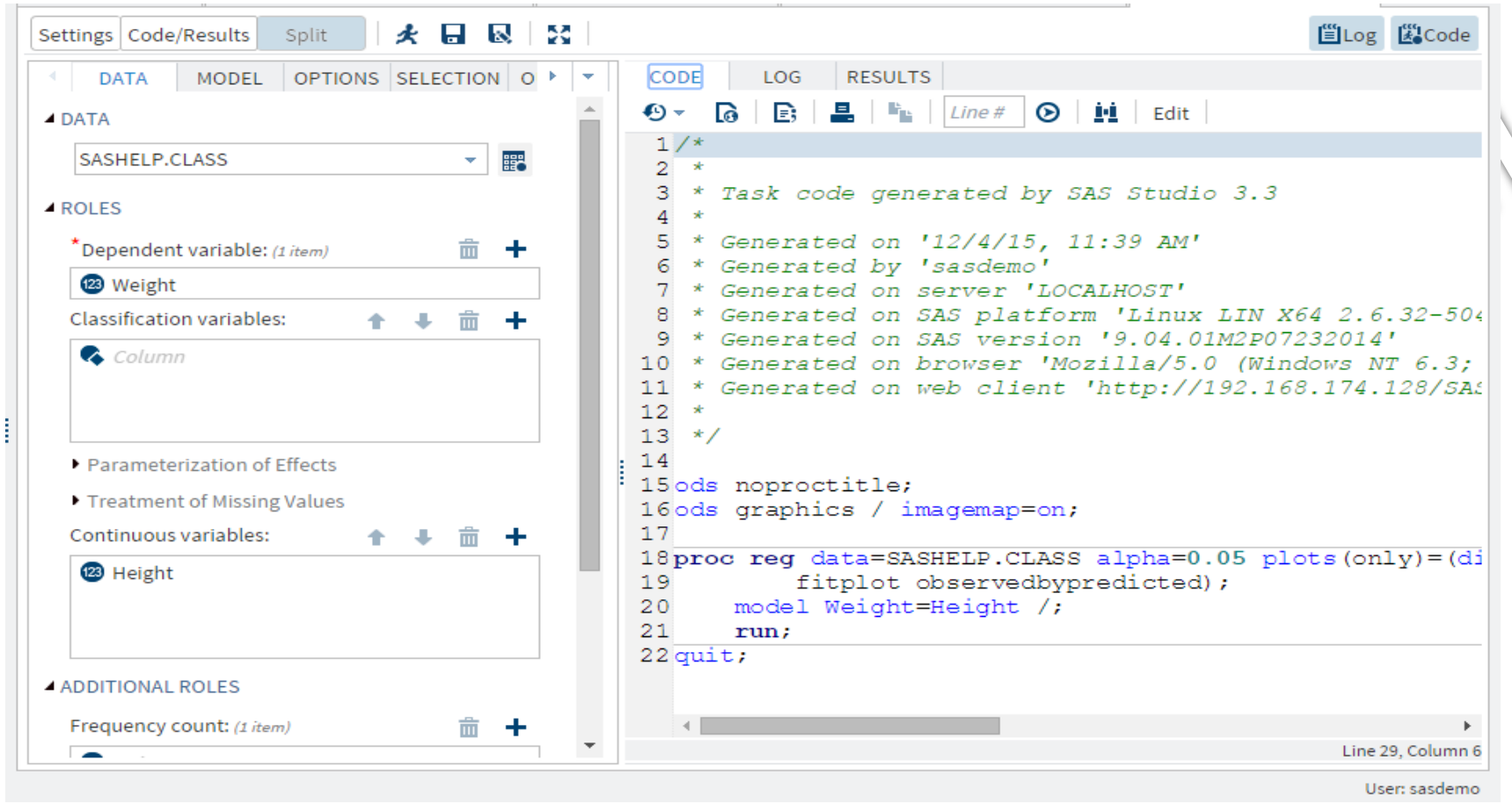
Assumptions:

- The mean of Y is linearly related to X.
- Errors are normally distributed.
- Errors have equal variances.
- Errors are independent.

Linear Regression

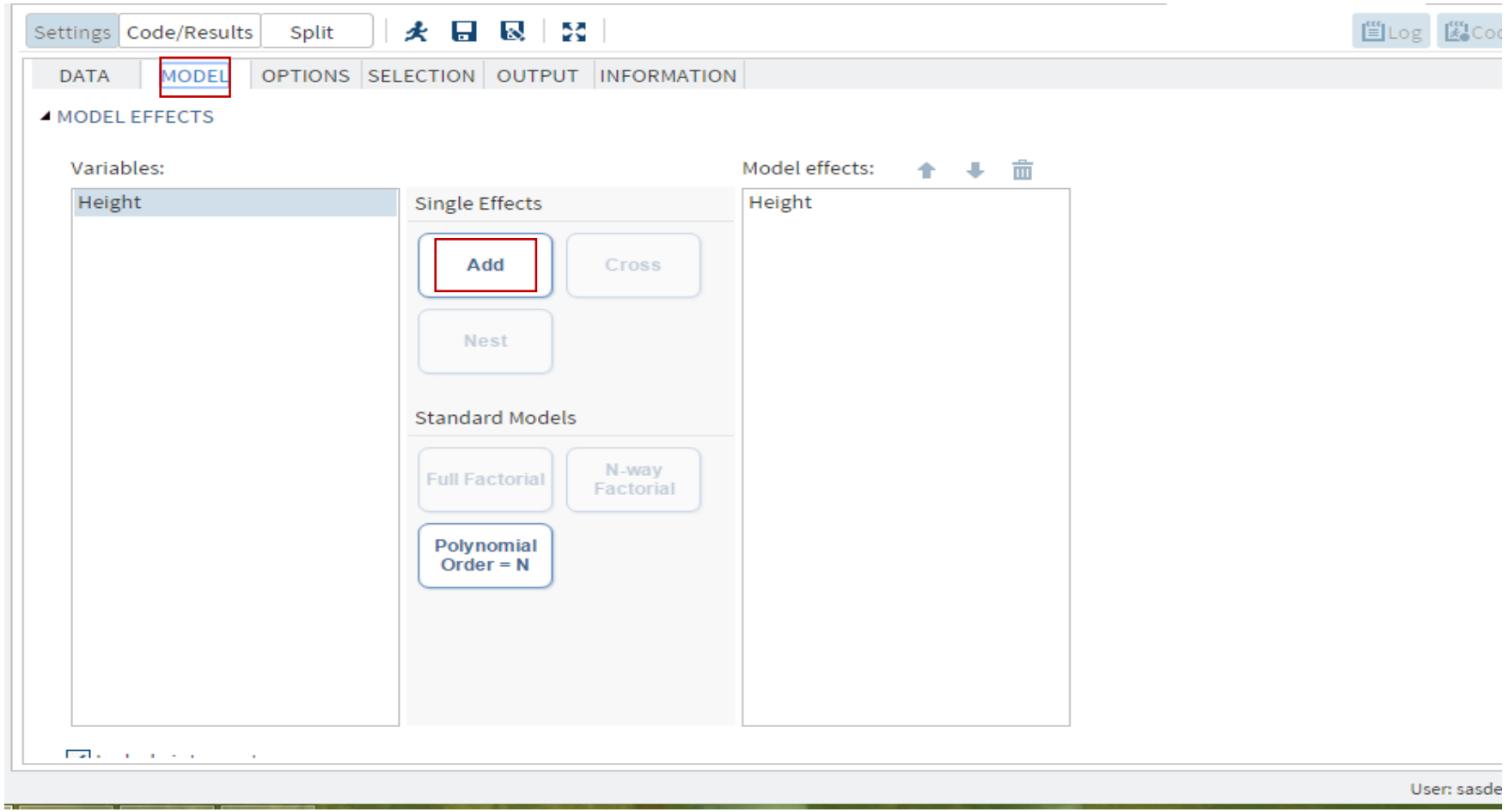


Linear Regression



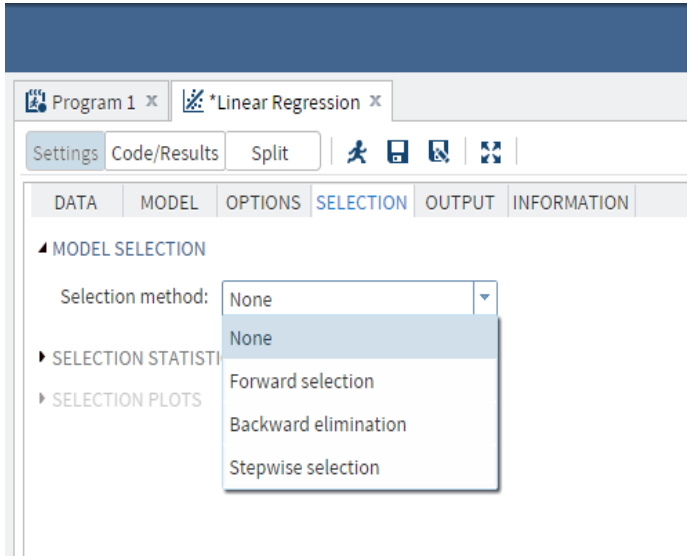
Classification variable specifies categorical variables that enter the regression model through the design matrix coding. Continuous variable specifies the numeric covariates (regressors) for the regression model. Both are independent variables.

Linear Regression



There are some more options for single effect like cross and nest. Also there are options for standard models also which are Full factorial, N-way factorial and Polynomial order = N.

Linear Regression

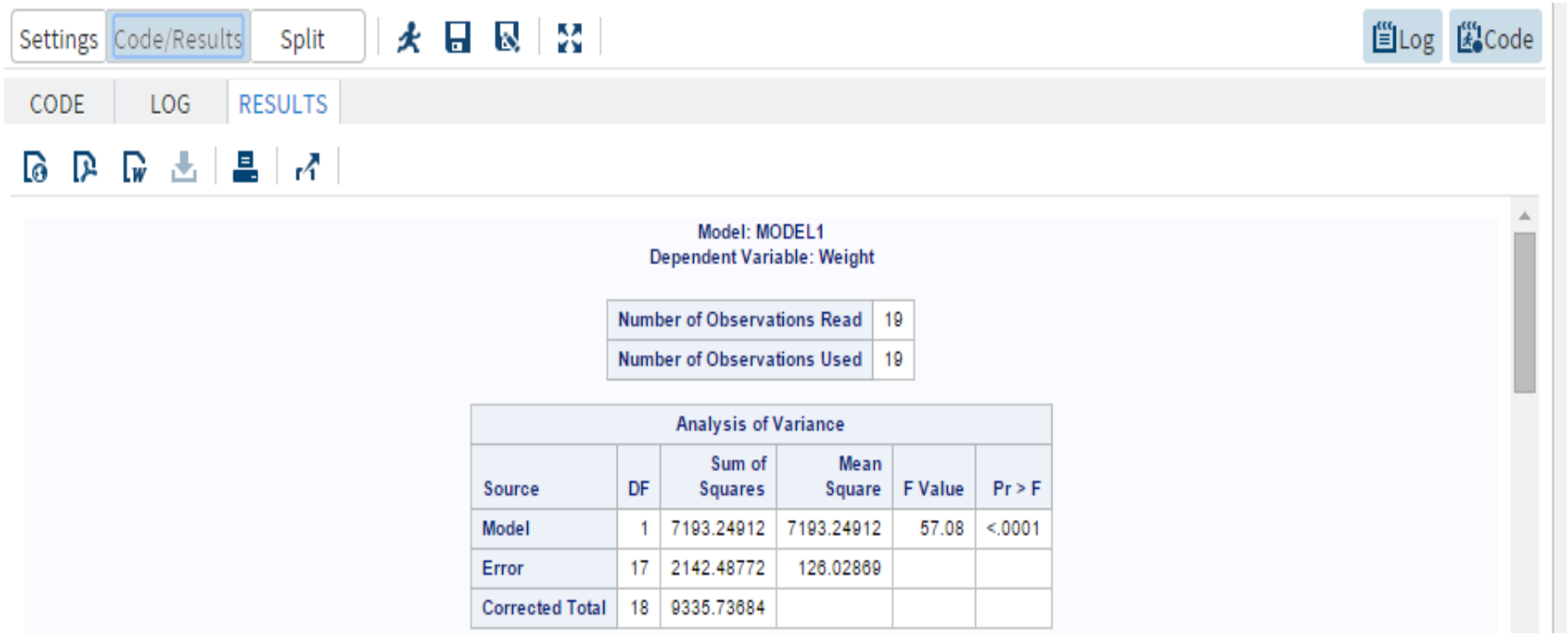


The **forward selection** technique begins with just the intercept and then sequentially adds the effect that most improves the fit. The process terminates when no significant improvement can be obtained by adding any effect

The **backward elimination** technique starts from the full model including all independent effects. Then effects are deleted one by one until a stopping condition is satisfied.

The **stepwise method** is a modification of the forward selection technique that differs in that effects already in the model do not necessarily stay there

Linear Regression



Model: MODEL1
Dependent Variable: Weight

Number of Observations Read	19
Number of Observations Used	19

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	1	7193.24912	7193.24912	57.08	<.0001
Error	17	2142.48772	126.02869		
Corrected Total	18	9335.73684			

The ANOVA table provides an analysis of the variability observed in the data and the variability explained by the the regression line.

Linear Regression

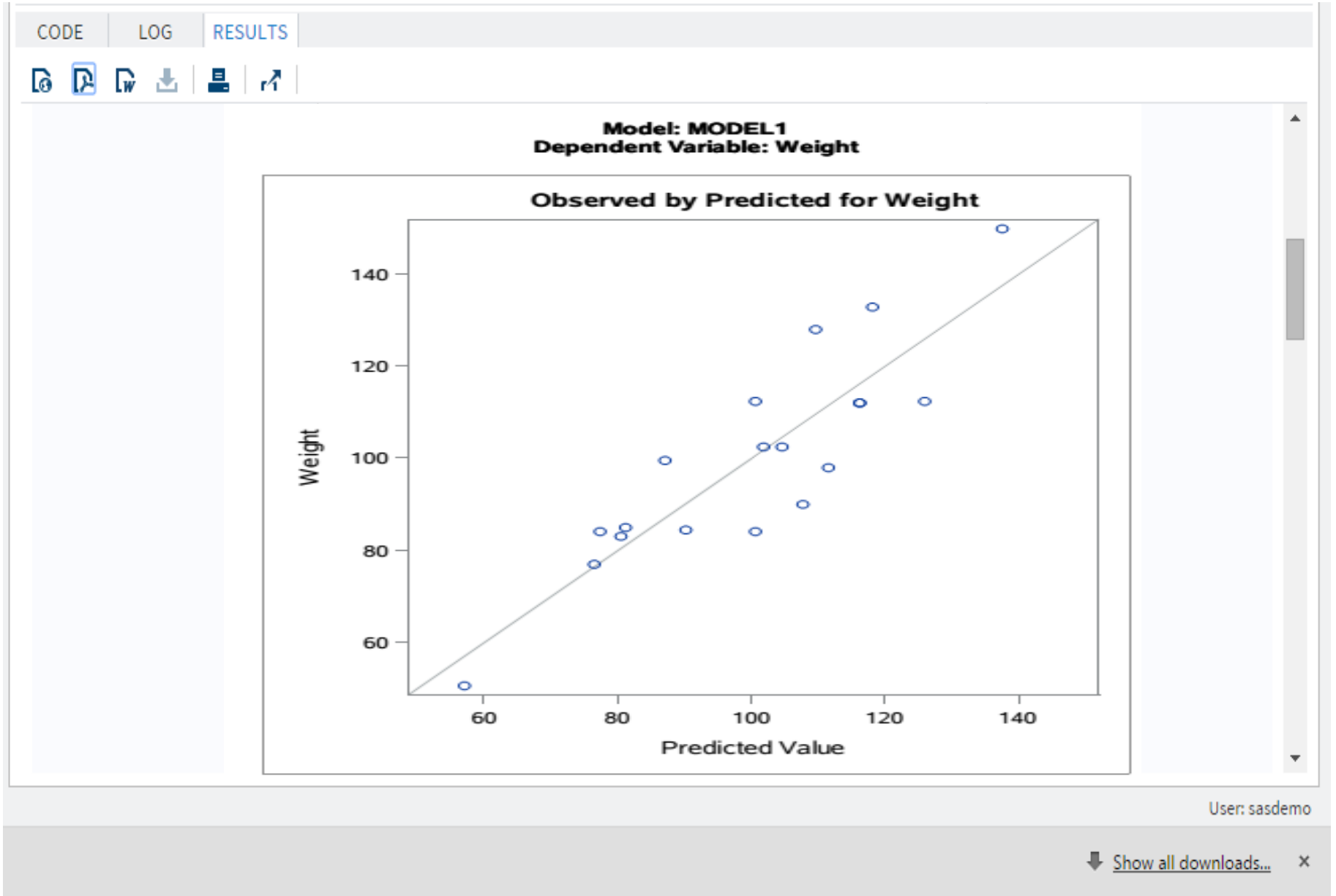
Root MSE	11.22625	R-Square	0.7705
Dependent Mean	100.02632	Adj R-Sq	0.7570
Coeff Var	11.22330		

Parameter Estimates

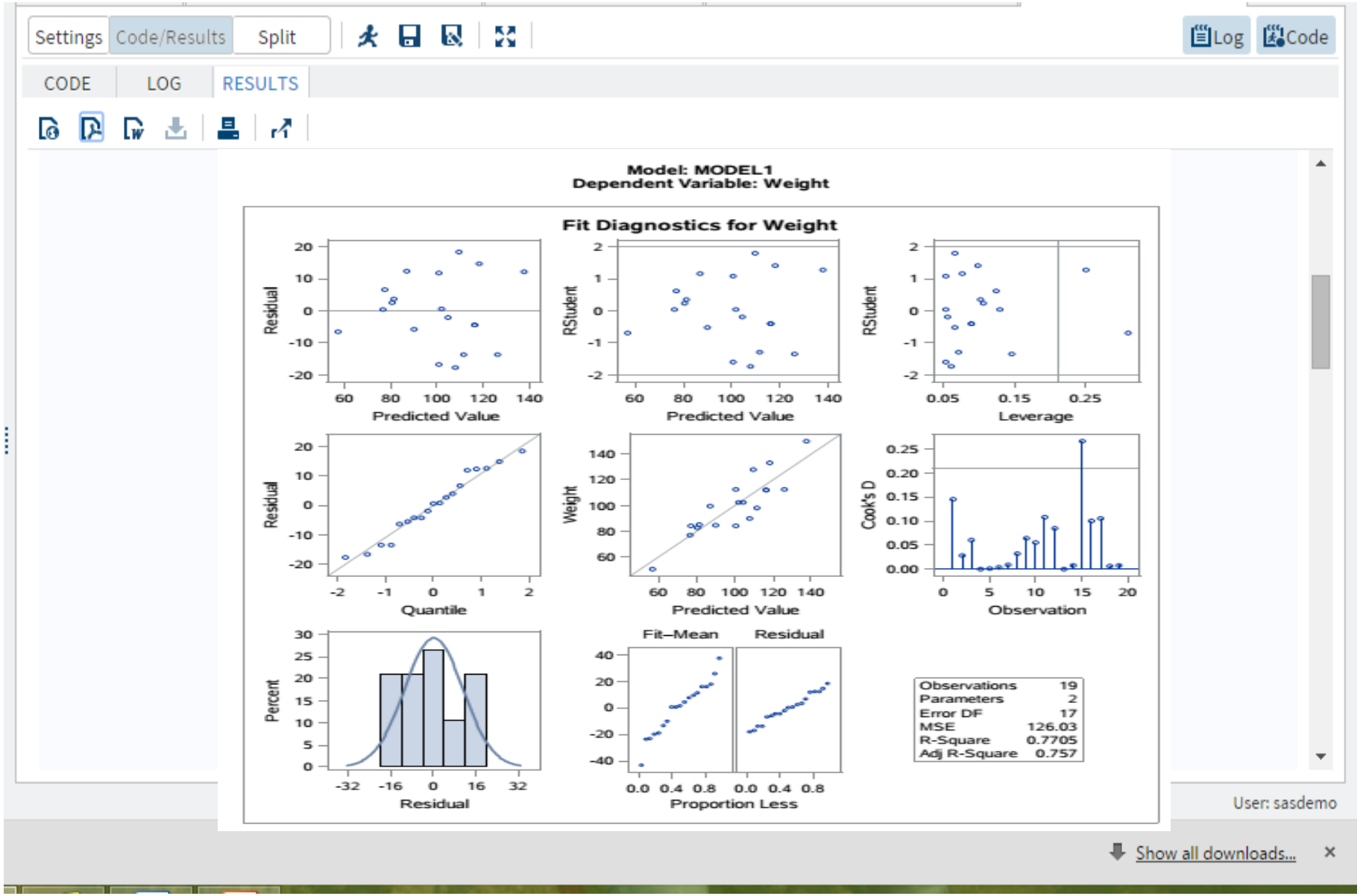
Variable	DF	Parameter Estimate	Standard Error	t Value	Pr > |t|
Intercept	1	-143.02692	32.27459	-4.43	0.0004
Height	1	3.89903	0.51609	7.55	<.0001

The parameter Estimates table defines the model for your data.

Linear Regression



Linear Regression



Assignment

1) Take a random sample which you have created using sashelp.heart. Check whether weight is based on height or not?

Data Visualization

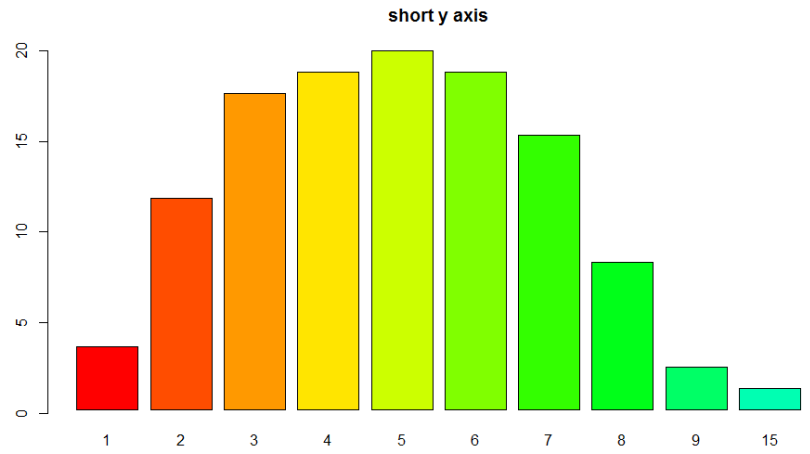
Data visualization using Graph Tasks

Purpose of Statistical Graphs

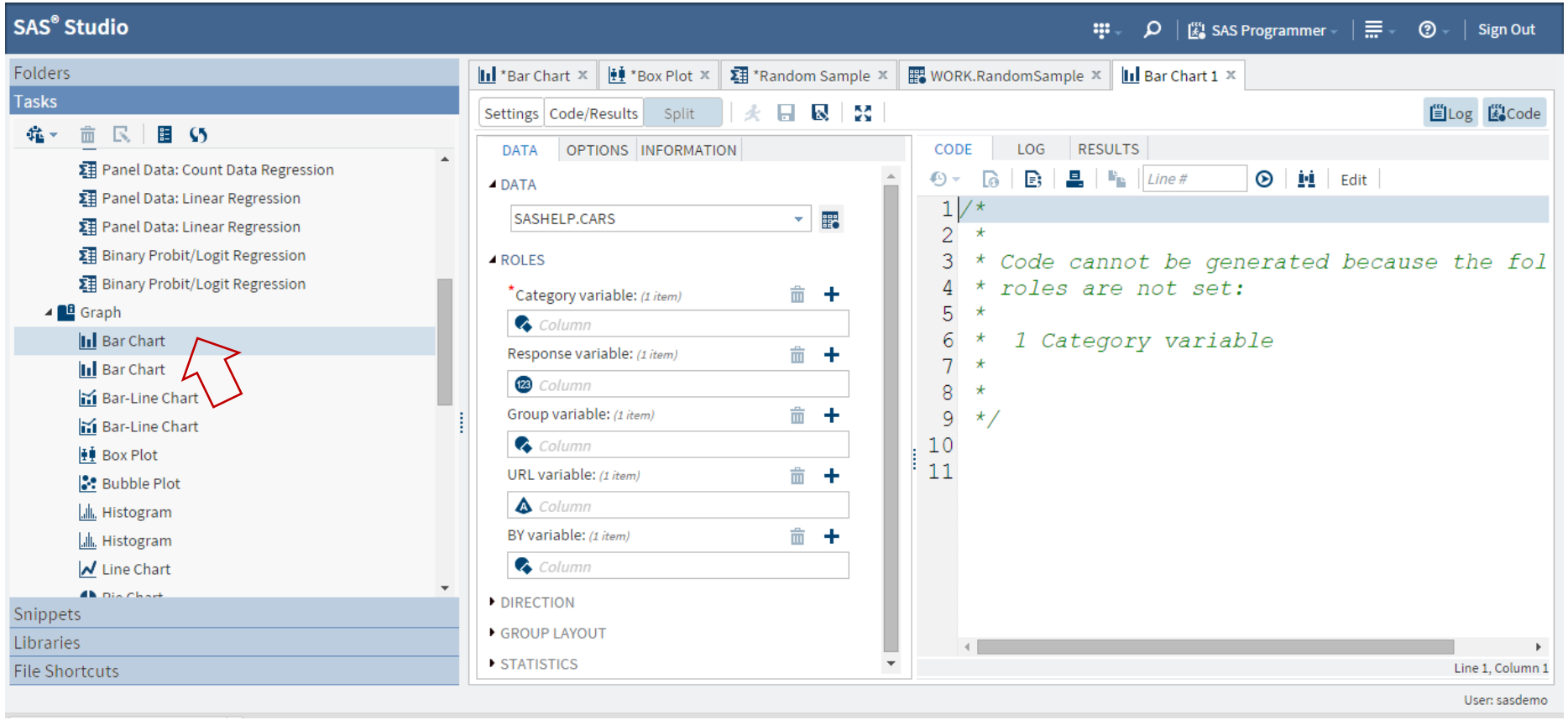
- To convey the data to the viewers in pictorial form
  - It is easier for most people to comprehend the meaning of data presented as a picture than data presented as a table. This is especially true if the viewers have little or no statistical knowledge
- To describe the data set
- To analyze the data set (Distribution of data set)
- To summarize a data set
- To discover a trend or pattern in a situation over a period of time
- To get the viewers' attention in a publication or speaking presentation

Bar Graphs

- Bar graph is a graphical display of data using bars of different heights.
- It is use in categorical data.
- Bar graph can be vertical and horizontal.



Bar Chart :Roles



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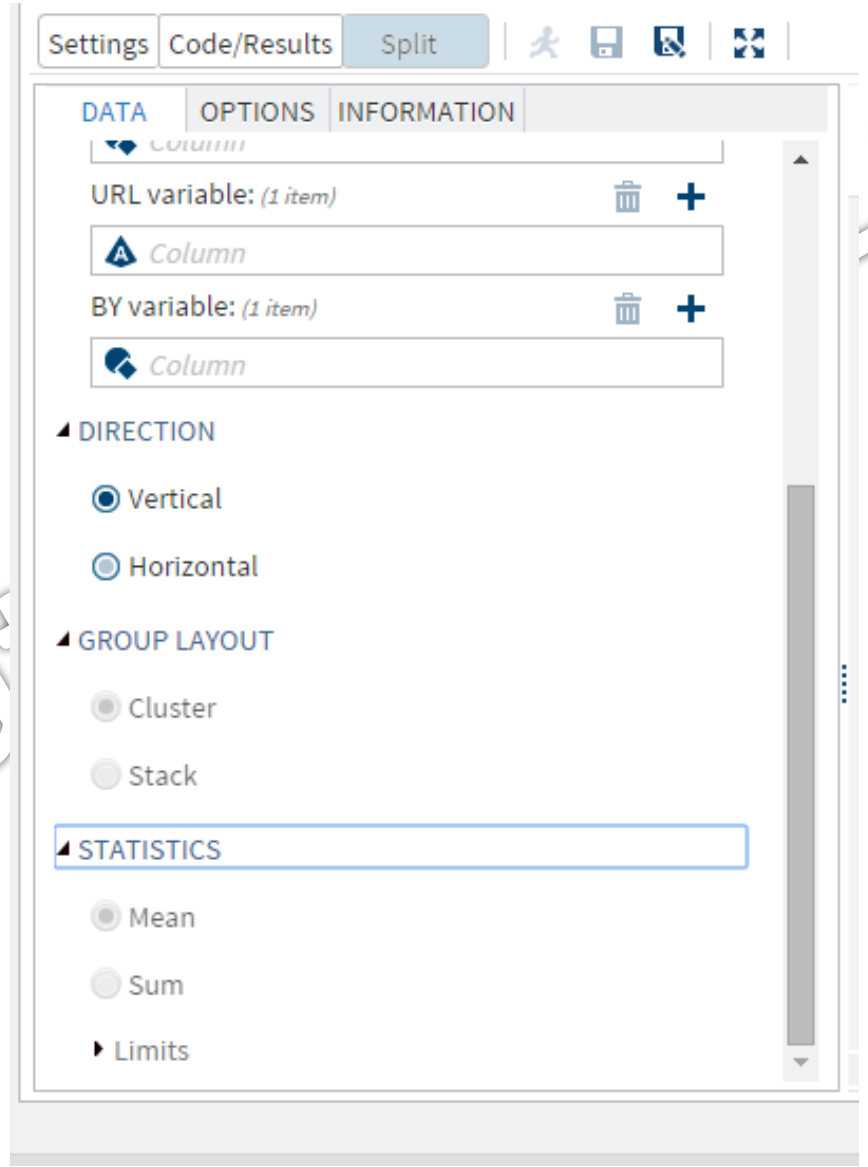
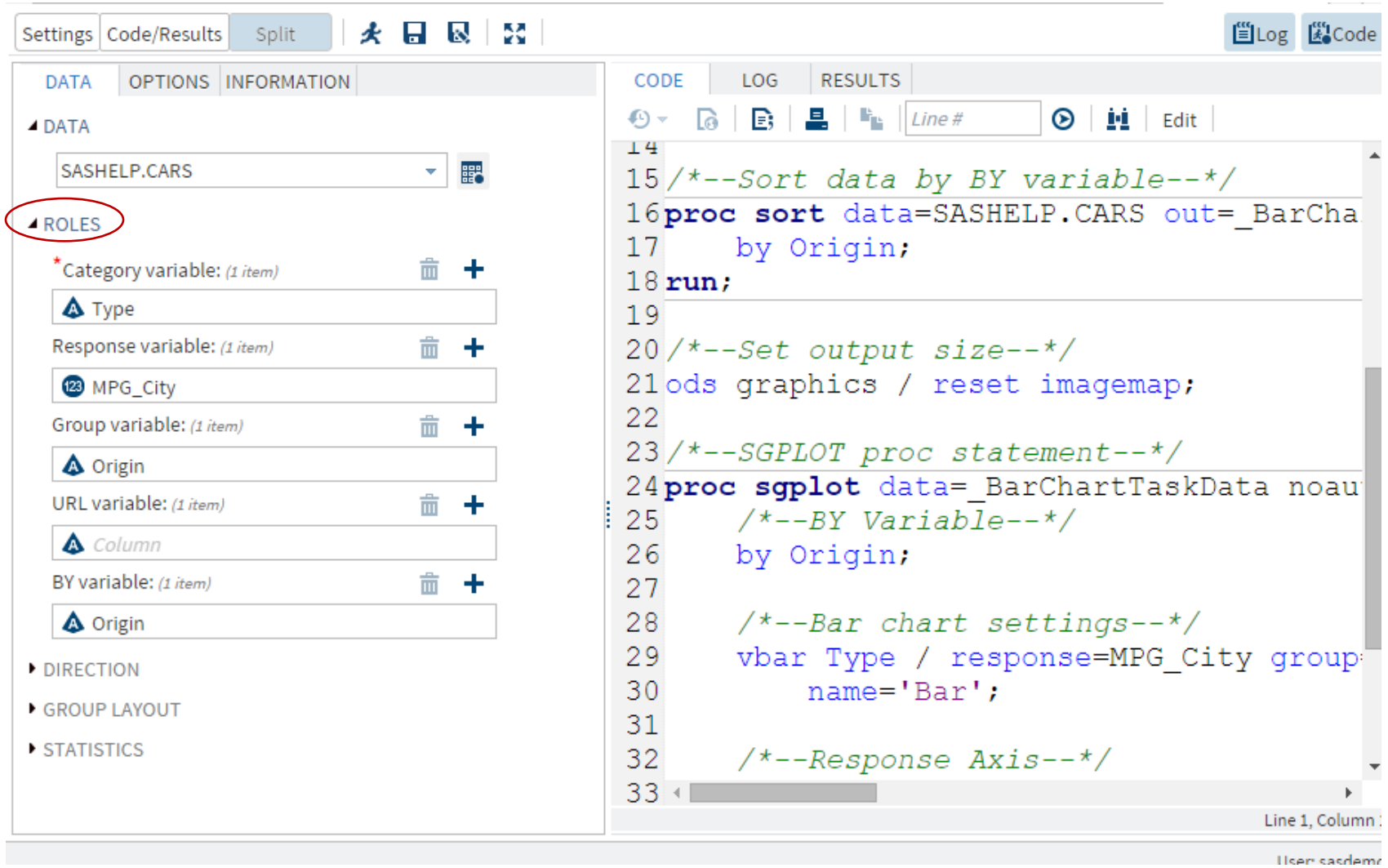
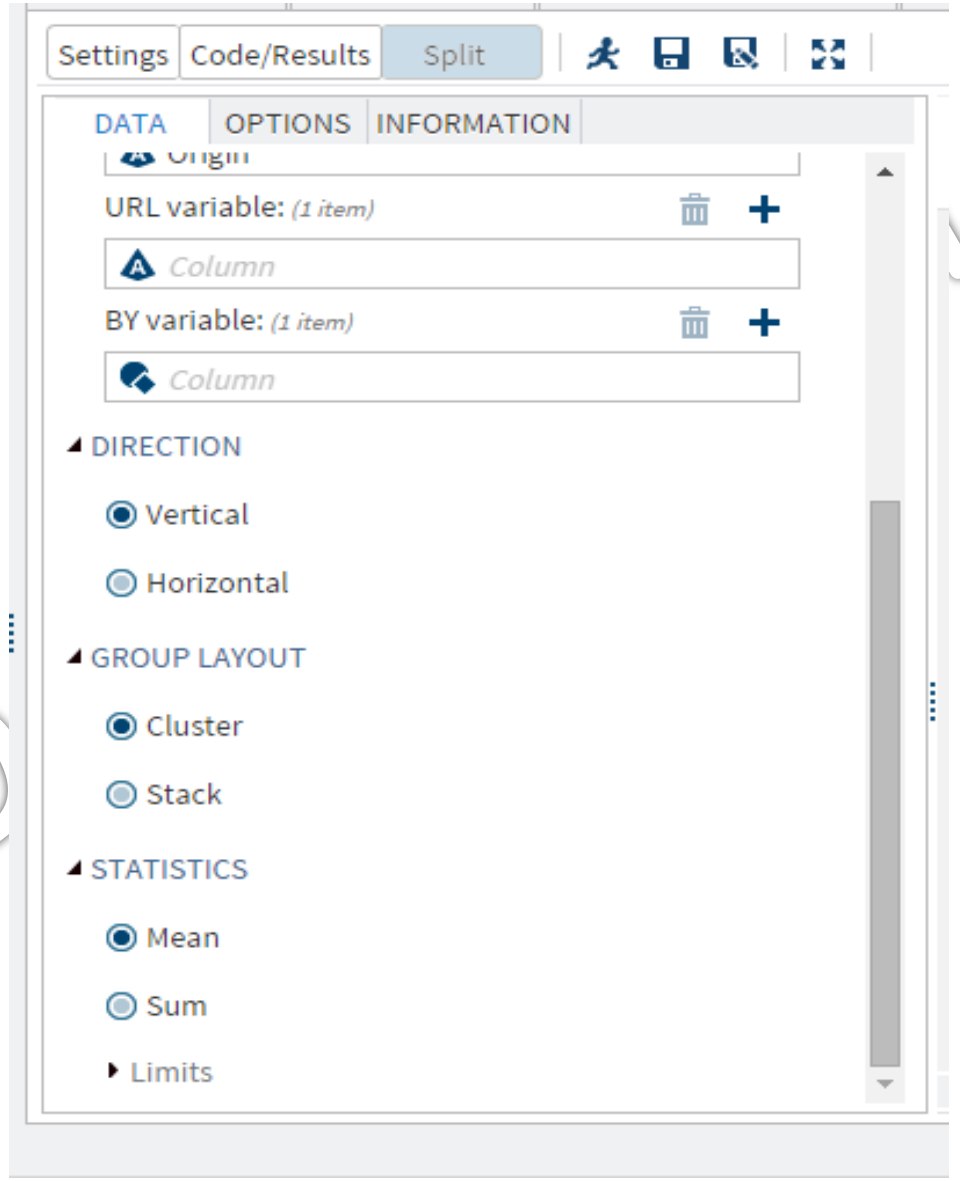
Bar Chart : Data



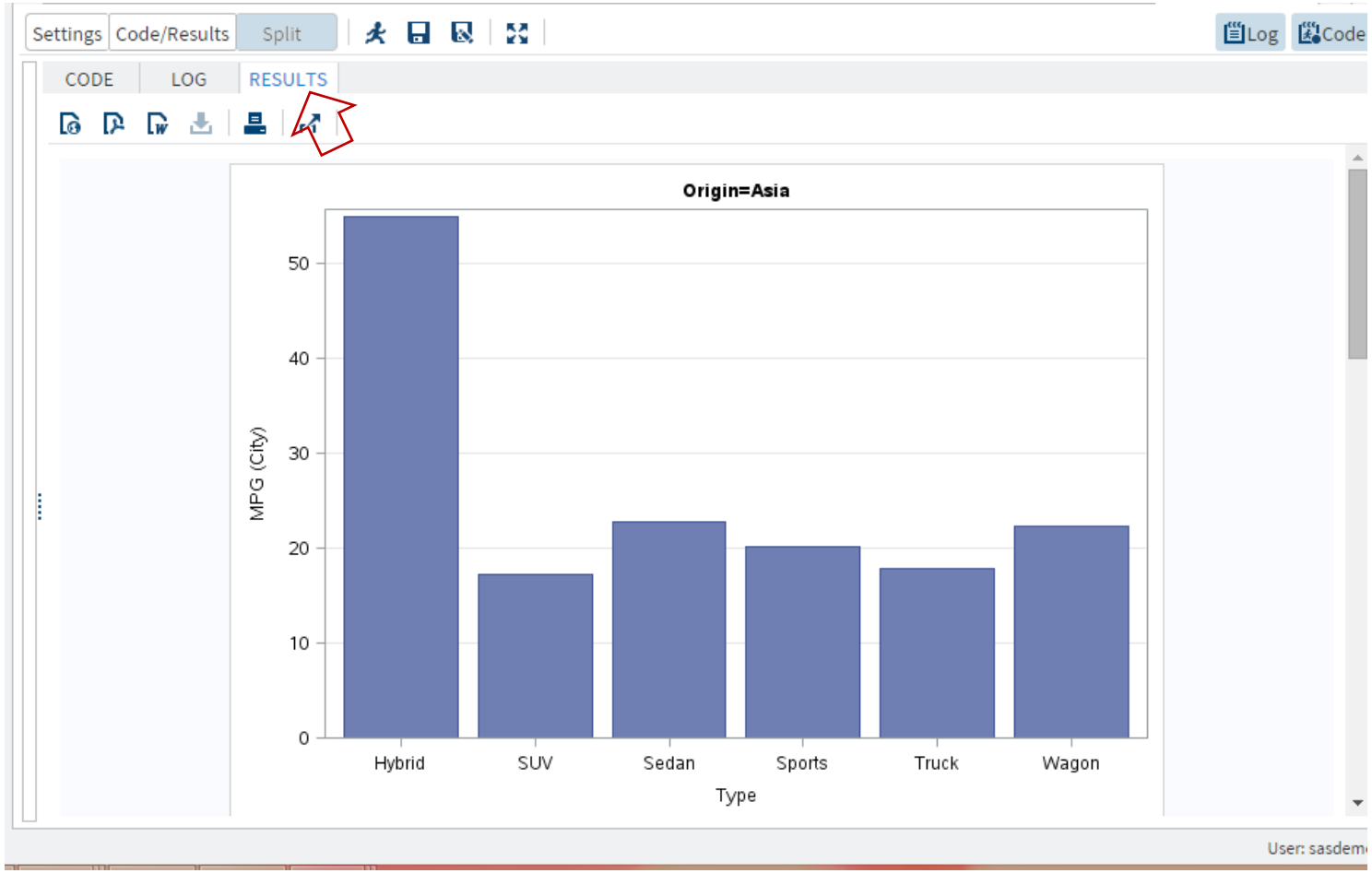
Bar Chart:Selecting Variables



Bar Chart:Selecting Variables



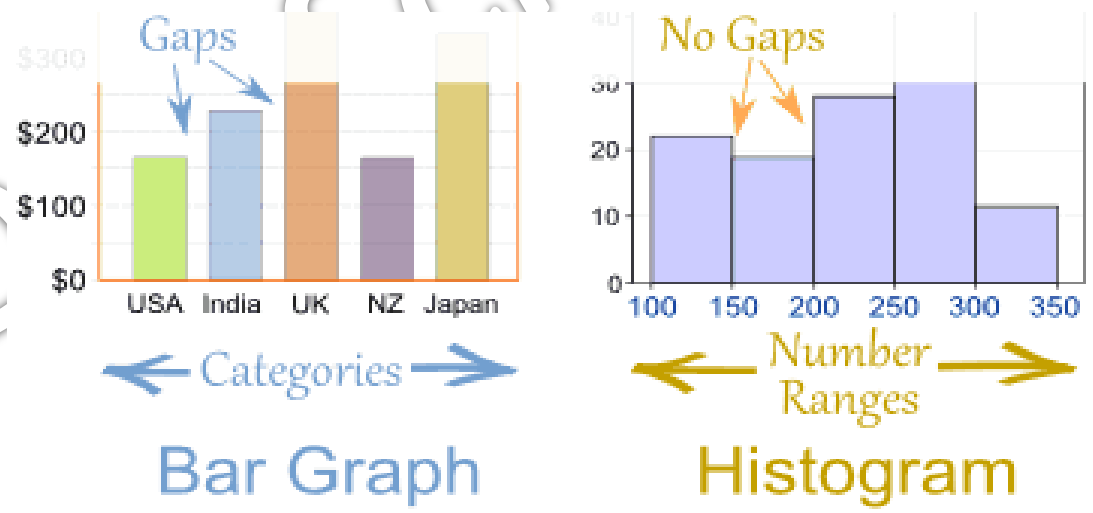
Bar Chart:Results



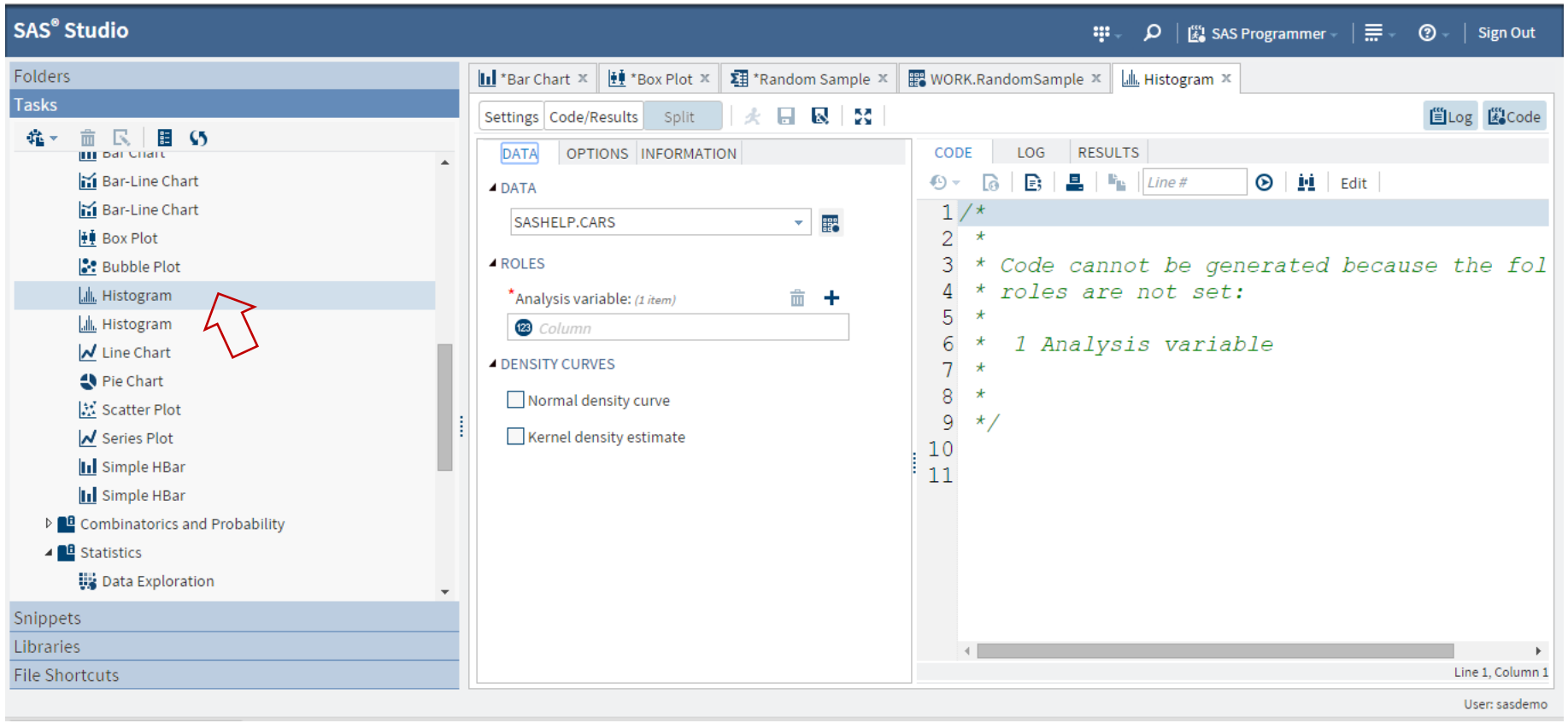
The bar plot is plotted for origin Asia .
In this plot hybrid type of car have good average .

Histogram

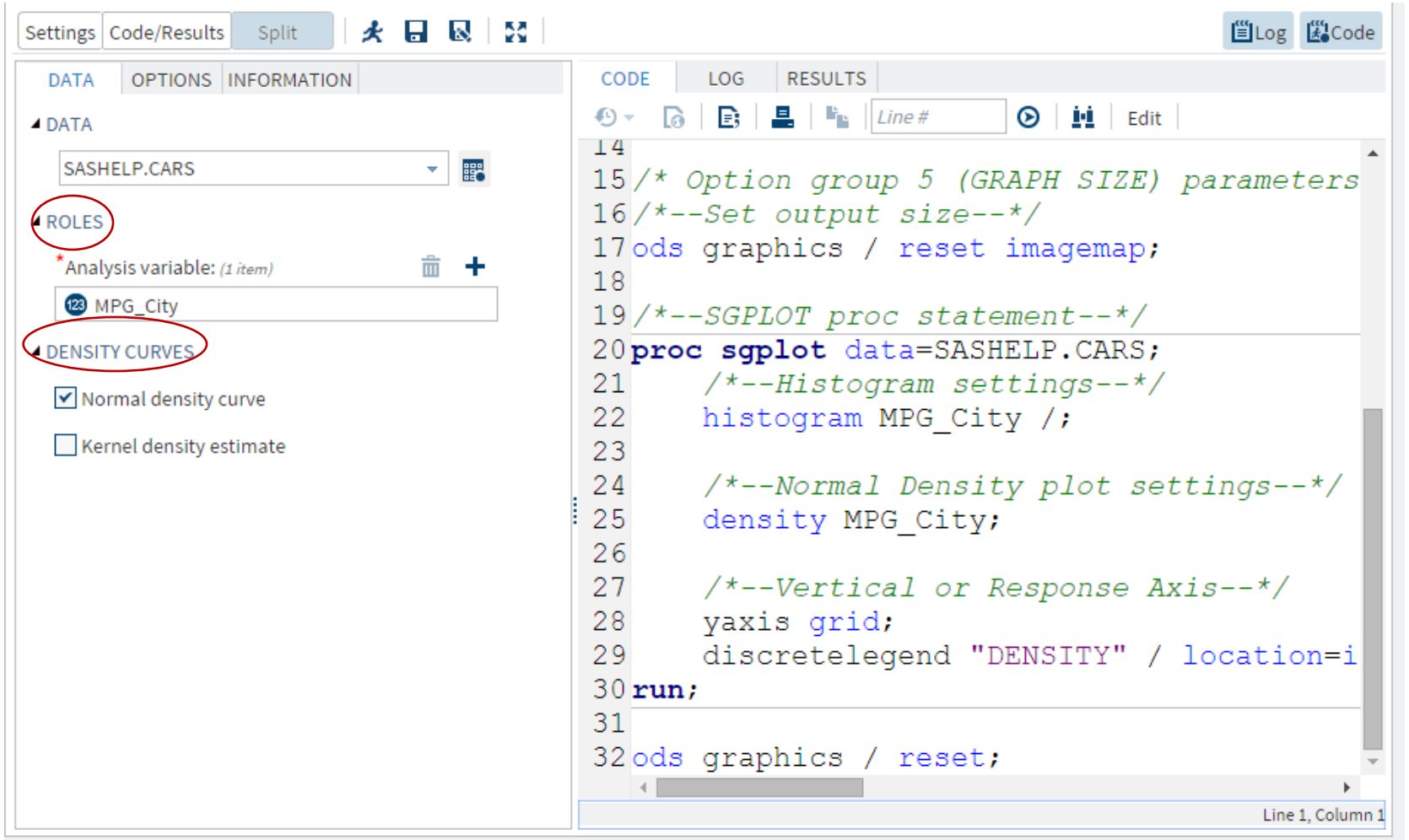
- A bar graph that displays the data from a frequency distribution.
- It is use in continuous data.



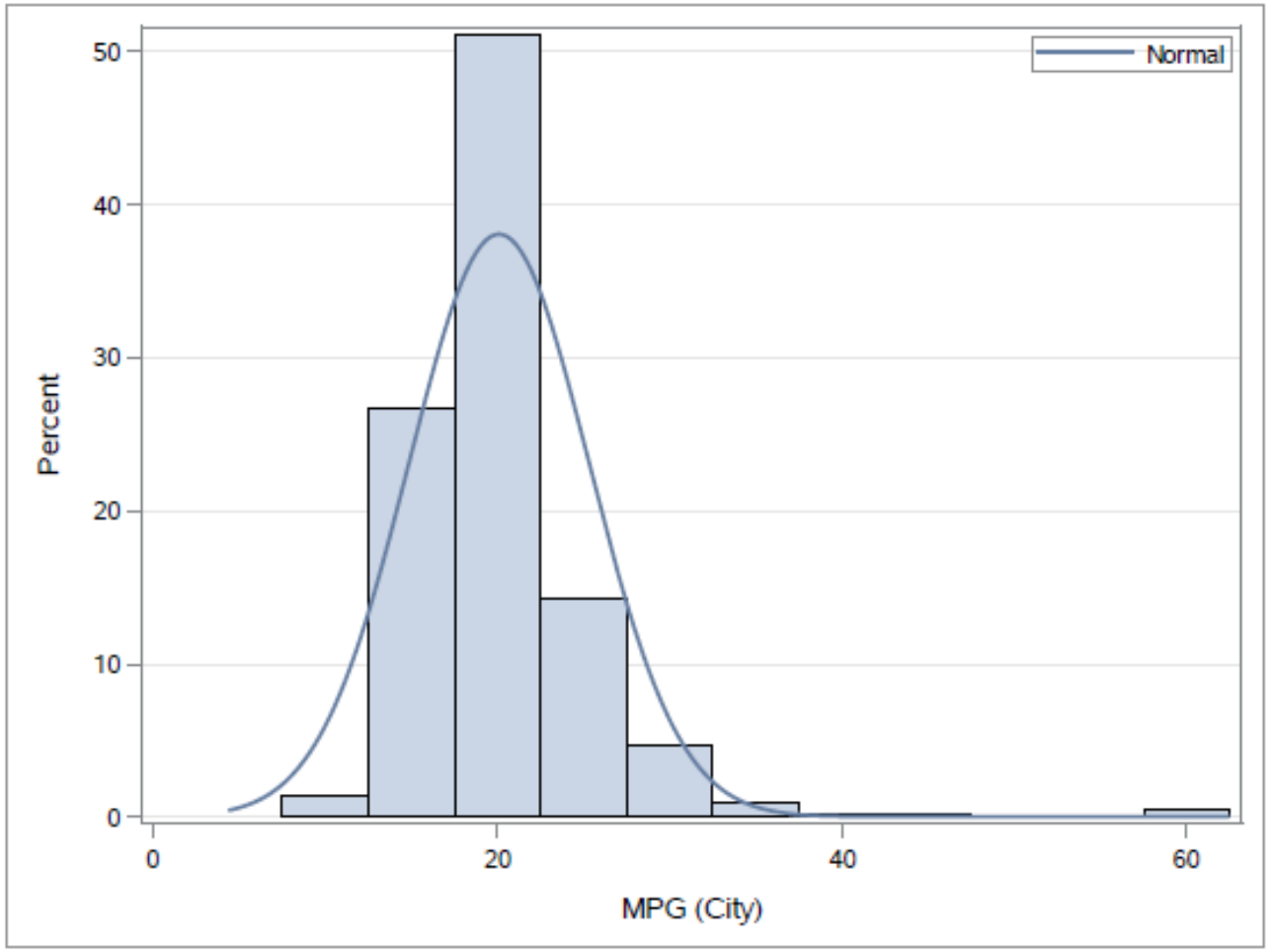
Histogram Plot :



Histogram Plot: Selecting Variables

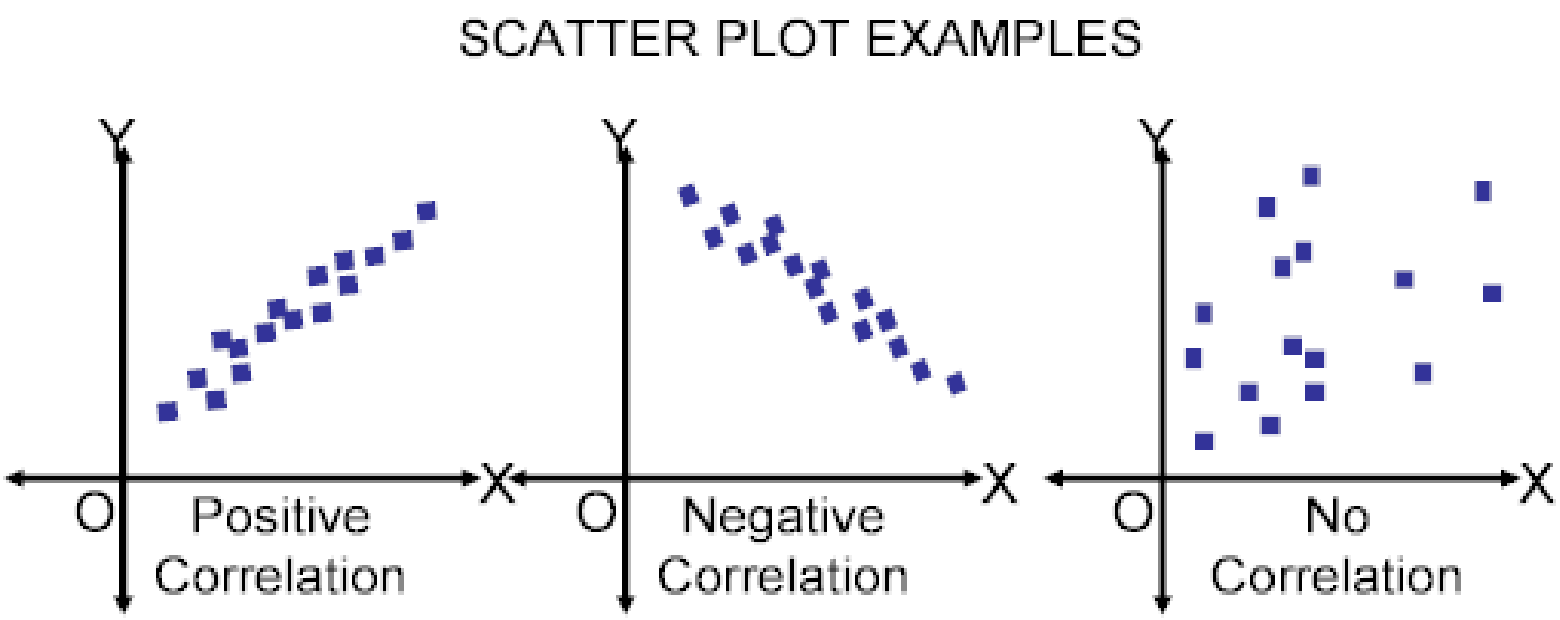


Histogram Plot : Results

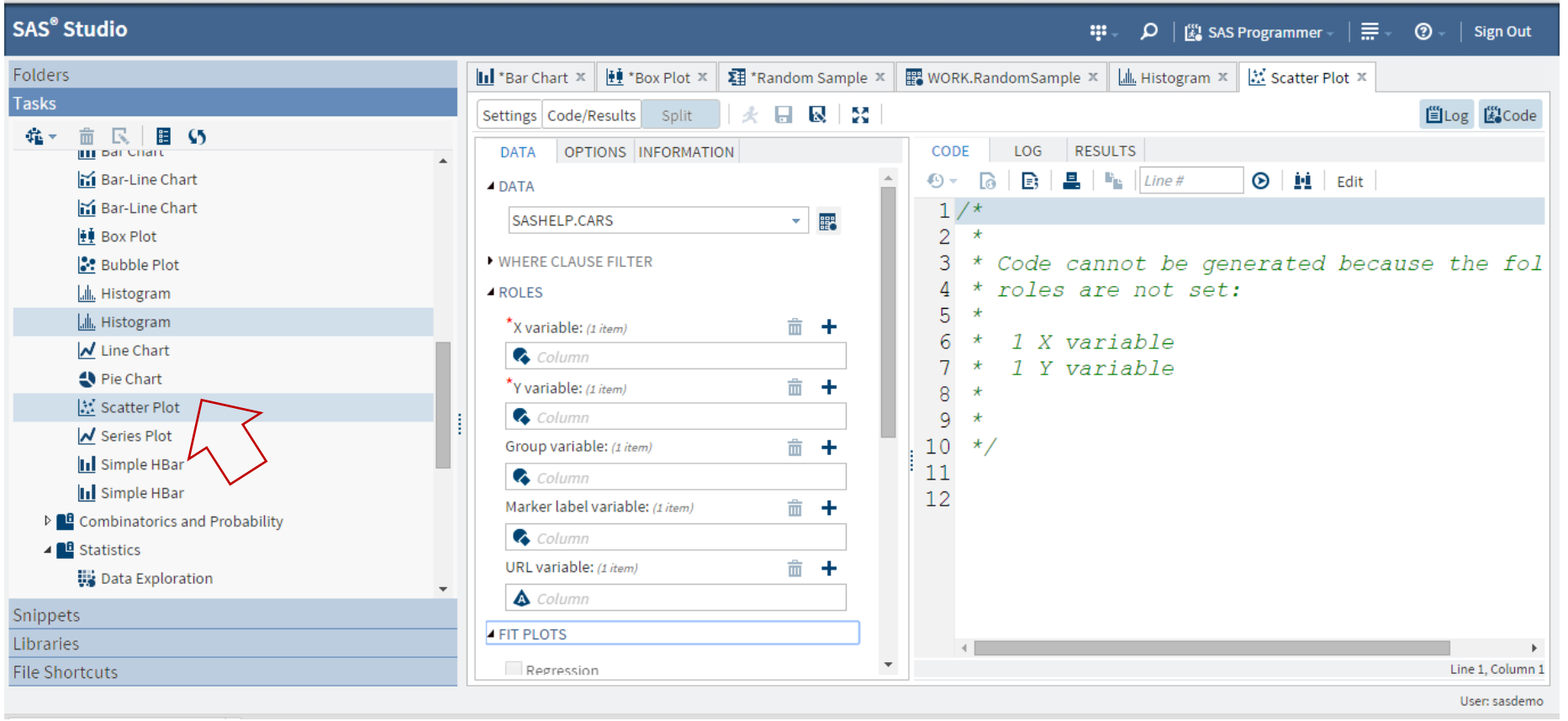


Scatter plot

- A scatter plot has points that show the relationship between two sets of data.
- Correlation :- when two set of data are strongly linked together.



Scatter plot:Data



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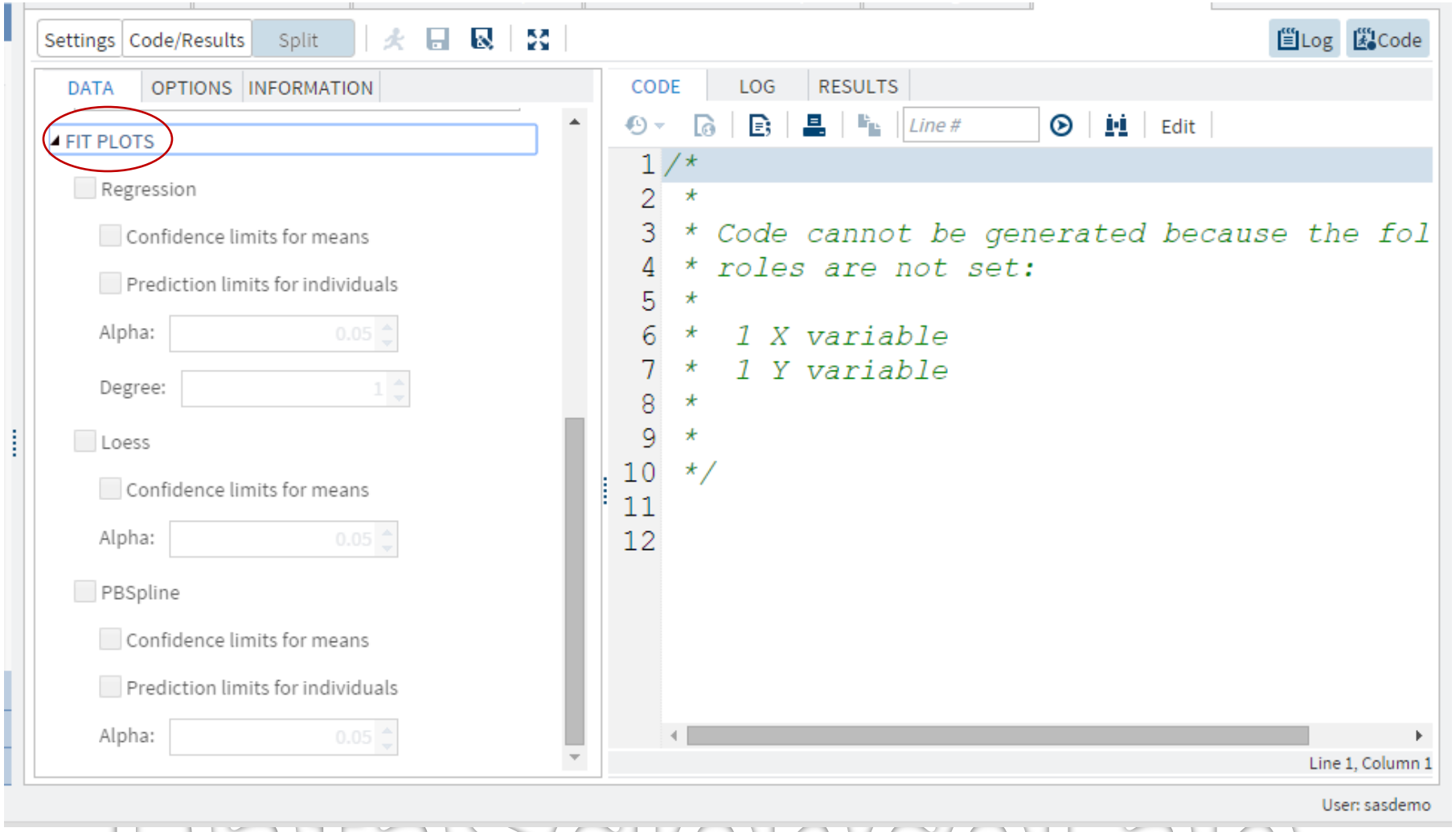
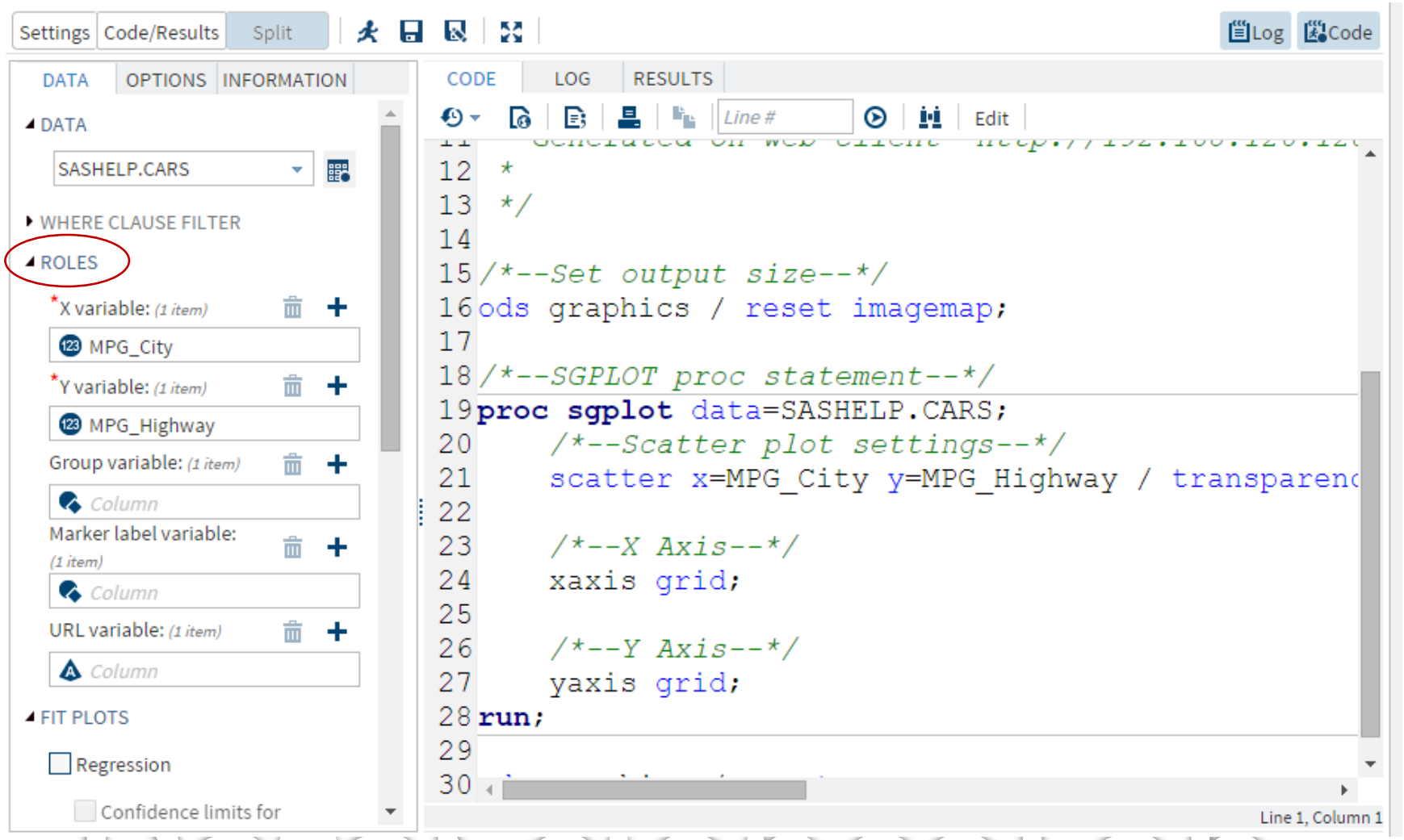
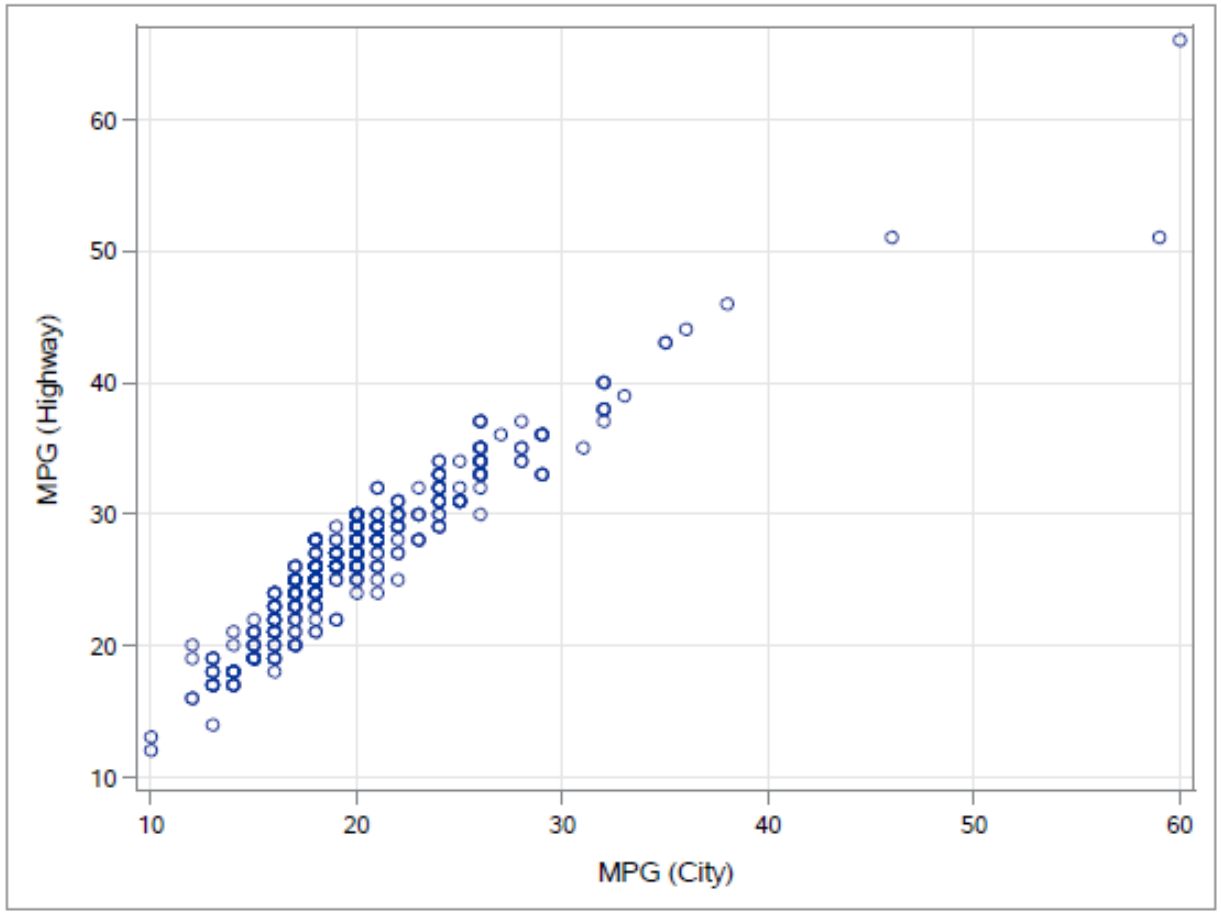
Scatter plot: Fit plots



Scatter plot : Selecting Variables

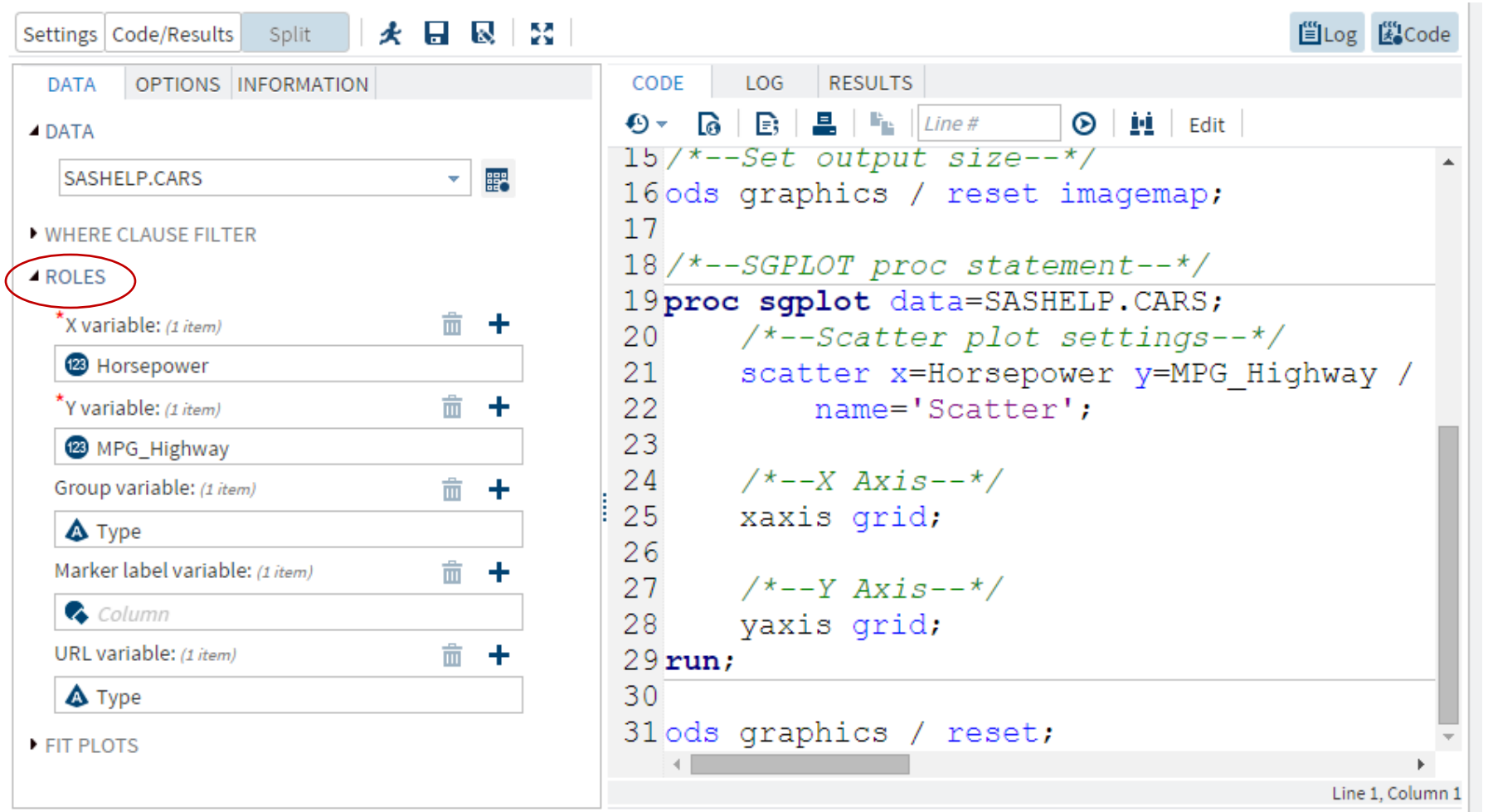


Scatter plot

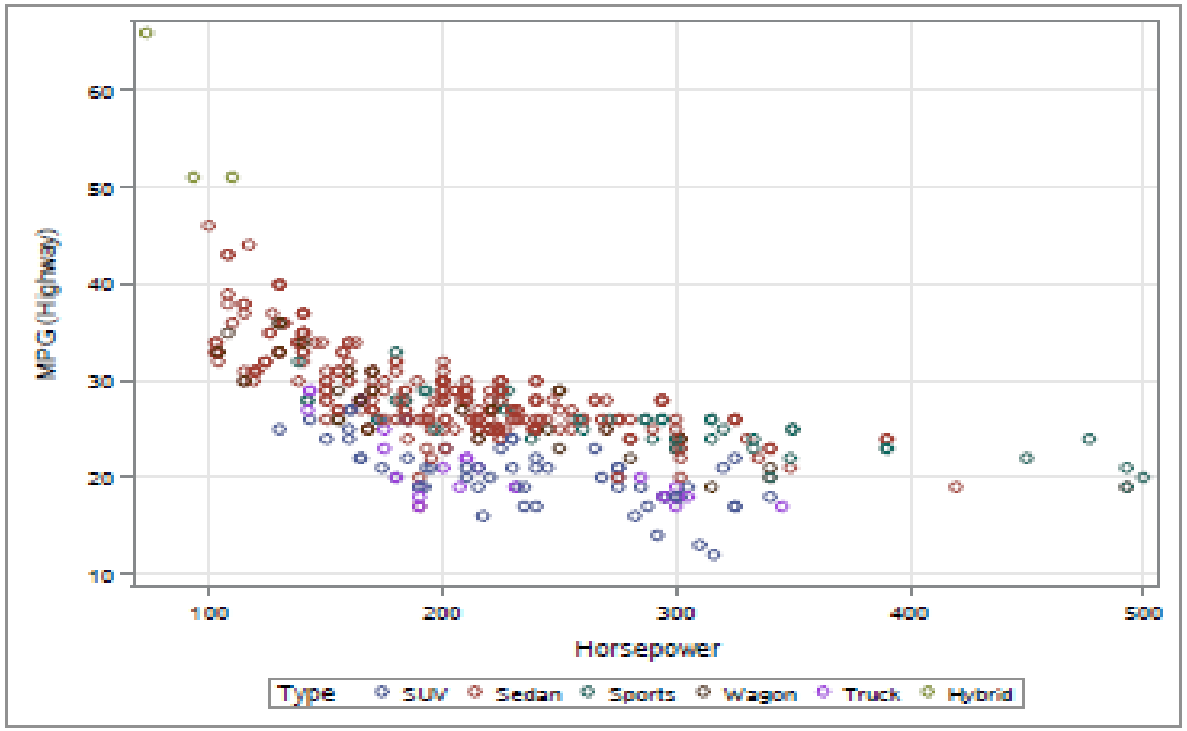


In this plot we understand it is a positive relationship between mpg_city and mpg_highway.

Scatter plot



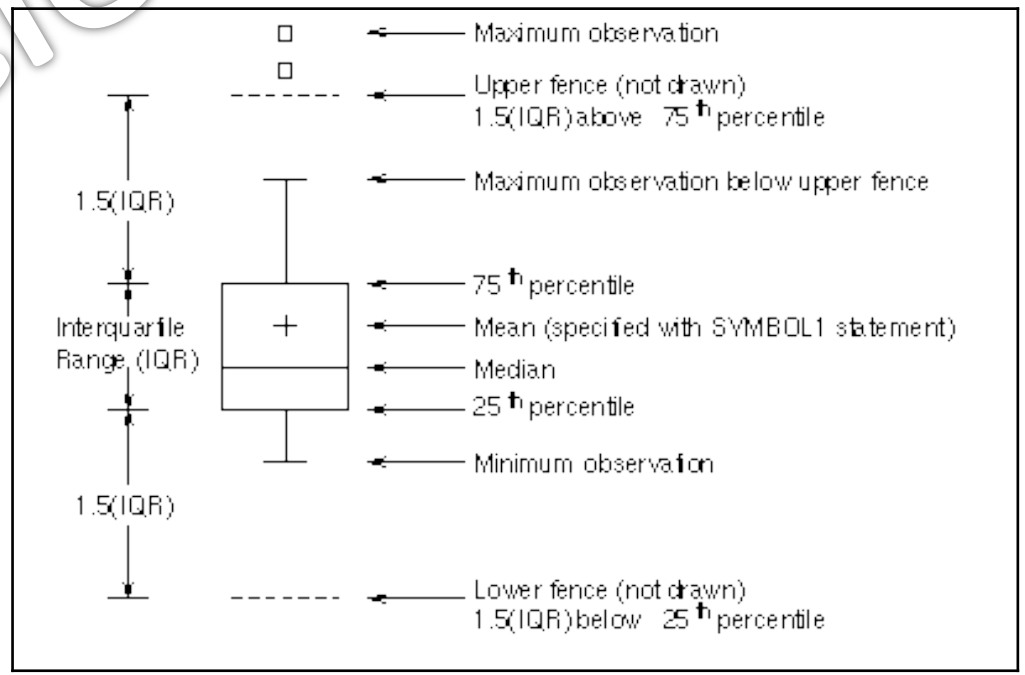
Scatter plot



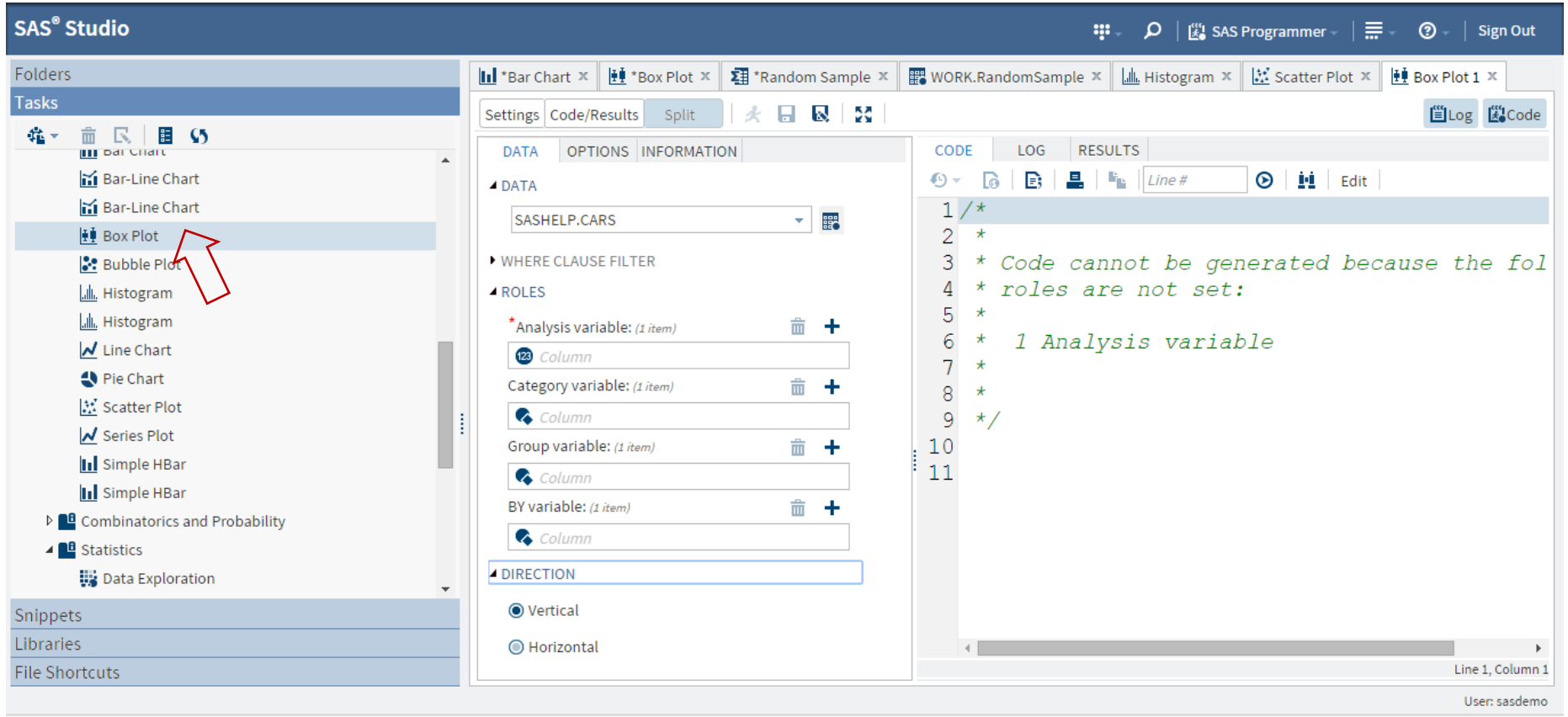
In this plot we understand that there is negative relationship between mpg_highway and horsepower according to their types of cars .

Box and Whisker plot

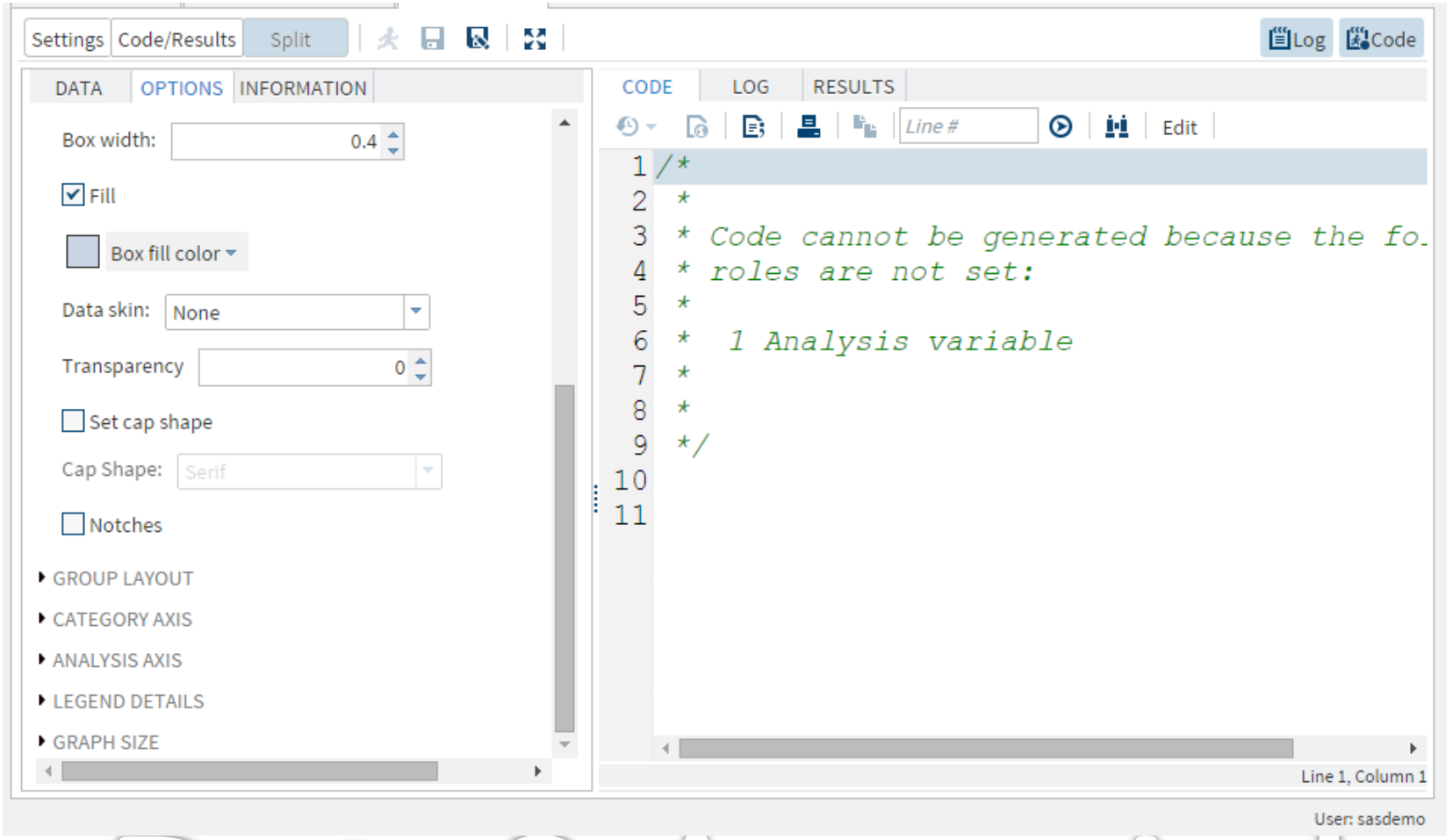
1. The center horizontal line in each box corresponds to the sample median and the central plus sign corresponds to the sample mean.



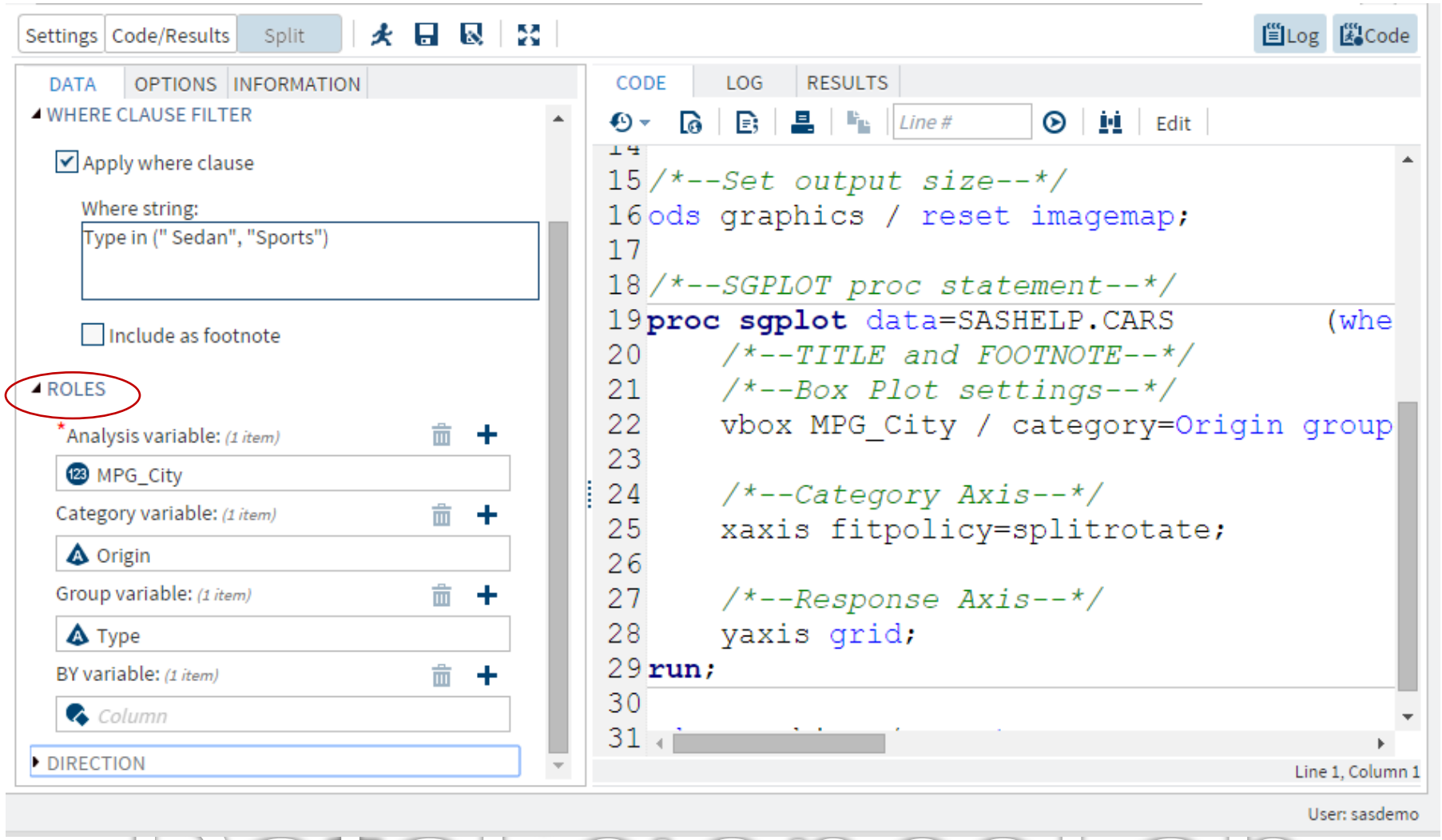
Box and Whisker plot:Data



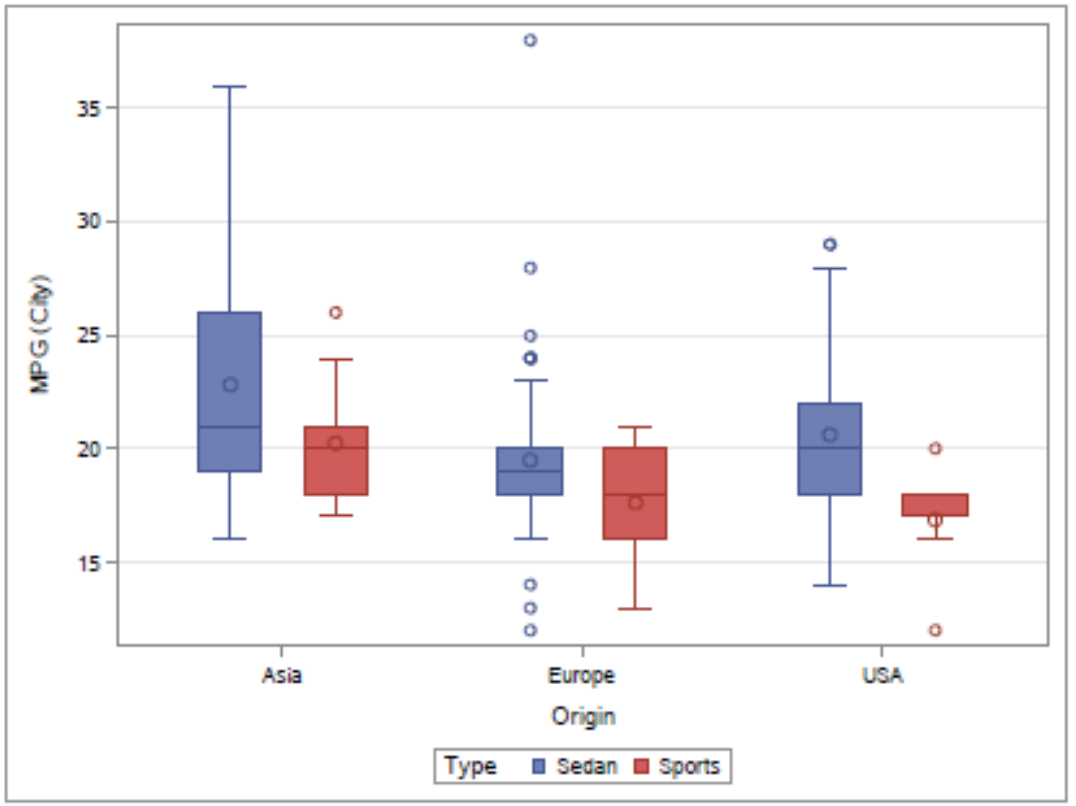
Box and Whisker plot:Options



Box and Whisker plot



Box and Whisker plot



In this plot we understand that sedan is more in Asia .
The box is plotted according to the type of cars and their respective mpg(miles per gallon).The sedan type of car give good average then sports car in Asia.
The sample mean is identify by the dot and median is the central tendency of the plot.

Assignment1

Plot a bar chart for chol_status by using sashelp.heart

Assignment2

Plot a histogram for height by using sashelp.class

Assignment3

Plot a scatter plot of x variable as weight and y variable as height from sashelp.class. Explore the graph and note down the points that you understand and also find the relationship between them .

Assignment4

Plot a box plot of analysis variable as weight and category variable as chol_status from sashelp.heart.

Thank you!