Introducing PROC R

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PROC R

Key Features

- Execute any R code inside a block in a SAS program
- Pass macro variables from SAS to R and back
- Move sas7bdat datasets in and out of R dataframes
- Call SAS functions in the R code
- Execute SAS code blocks in the R code
- Create R graphics and display in results window

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Moving Datasets

- **sd2df():** currently uses the haven package to move a SAS dataset to an R dataframe
  - df <- sd2df("sashelp.heart") # Moves dataset to R dataframe

- **df2sd():** writes dataframe to a SAS dataset
  - df2sd(df,"SDTM.AE") # Moves dataframe to SDTM.AE table

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Using Macro Variables

- **symget():** retrieves the value of a SAS macro variable
  - user = symget("SYSUSERID") # Assign the value SYSUSERID to an R variable

- **symput():** sets the value of a SAS macro variable
  - symput("team", "Biostatistics") # Creates a macro variable called team with the value of “Biostatistics”

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Datasets and Macros

Code | Log | Results | Output Data (1)

```
1  PROC R;
2  SUBMIT;
3
4  ver = R.version.string
5  location = R.home()
6  pkg = as.data.frame(installed.packages()[,c(1,3)])
7
8  df2sd(pkg, "Work.Packages")
9  symput("version",ver )
10 symput("location",location )
11
12 ENDSUBMIT;
13 RUN;
14
15 /* Make a quick report in results tab */
16
17 TITLE "Package Listing from &version";
18 TITLE2 "R Location: &location";
19 PROC SQL;
20   Select Package, version
21   from packages
22   order by upcase(Package);
23 quit;
24 TITLE;
25 TITLE2;
26
```

Move dataframes to datasets and use them

Define macro variables in R and move to SAS

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Datasets and Macros

Results | Output Data (1)

&version

Package Listing from R version 4.4.3 (2025-02-28)
R Location: /opt/sas/viya/home/sas-pyconfig/R-4.4.3.1780067812199582/lib64/R

&location

first 12 of 373 packages in WORK.Packages table

Package	Version
abind	1.4-8
arrow	24.0.0
askpass	1.2.1
assertthat	0.2.1
backports	1.5.1
bartCause	1.0-10
base	4.4.3
base64enc	0.1-6
bbmle	1.0.25.1
BCEA	2.4.83
bdsmatrix	1.3-7
BH	1.90.0-1

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SAS Functions and Submits

- sasfnc(“*function*”,”*arg1*”,”*arg2*”,...) will execute a SAS function with the list of passed arguments

- submit(“*SAS code*”) – execute the SAS code upon exit of the PROC R submission

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SAS Functions and Submits

Code

```
1
2   %let inputTable = SASHELP.HEART;
3
4   proc R;
5   submit;
6
7   # Set up libraries and read in data
8   library(dplyr)
9   library(ggplot2)
10
11  df= sd2df(symget("inputTable"))          # Mo
12
13  dead <- df %>% filter(Status == "Dead")
14  df2sd(dead,"Dead")
15  symput("numDead",nrow(dead) )
16
17  submit("%put &=numDead;")                # Execute SAS Code on exit
18  hello = sasfnc("propcase","HELLo WORld")
19  print(hello)
20
21
22  endsubmit;
23  RUN;
24
```

```
106  %put &=numDead;
NUMDEAD=1991
[df2sd] SUCCESS: R data frame (1991 x 17) exported to SAS dataset work.Dead
[1] "Hello World"
NOTE: PROCEDURE R used (Total process time):
      real time           1.31 seconds
      cpu time            1.13 seconds
```

SAS functions execute in R session

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Print vs Show

- Using the print function in R will print results to the log

```
1  PROC R;
2  SUBMIT;
3
4  library(ggplot2)
5  df = sd2df("sashelp.heart")
6  print(head(df))
7
```

```
  Status DeathCause AgeCHDdiag    Sex AgeAtStart Height Weight Diastolic
1   Dead      Other         NA Female          29  62.50    140        78
2   Dead     Cancer         NA Female          41  59.75    194        92
3  Alive                    NA Female          57  62.25    132        90
4  Alive                    NA Female          39  65.75    158        80
5  Alive                    NA   Male          42  66.00    156        76
6  Alive                    NA Female          58  61.75    131        92
  Systolic MRW Smoking AgeAtDeath Cholesterol Chol_Status BP_Status
1      124 121       0         55          NA                Normal
2      144 183       0         57         181   Desirable      High
3      170 114      10         NA         250        High      High
4      128 123       0         NA         242        High    Normal
5      110 116      20         NA         281        High   Optimal
6      176 117       0         NA         196   Desirable      High
```

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Print vs Show

- To send the output to the results window, use show(*dataframe, title, number of records*)

```
1  PROC R;
2  SUBMIT;
3
4  library(ggplot2)
5  df = sd2df("sashelp.heart")
6  print(head(df))
7
8  show(df,"SASHELP.HEART", 15)
```

Log | Results | Output Data

SASHELP.HEART

Obs	Status	DeathCause	AgeCHDdiag	Sex	AgeAtStart	Height	Weight	Diastolic	Systolic	MRW	Smoking	AgeAtDeath
1	Dead	Other	.	Female	29	62.50	140	78	124	121	0	55
2	Dead	Cancer	.	Female	41	59.75	194	92	144	183	0	57
3	Alive		.	Female	57	62.25	132	90	170	114	10	.
4	Alive		.	Female	39	65.75	158	80	128	123	0	.
5	Alive		.	Male	42	66.00	156	76	110	116	20	.
6	Alive		.	Female	58	61.75	131	92	176	117	0	.

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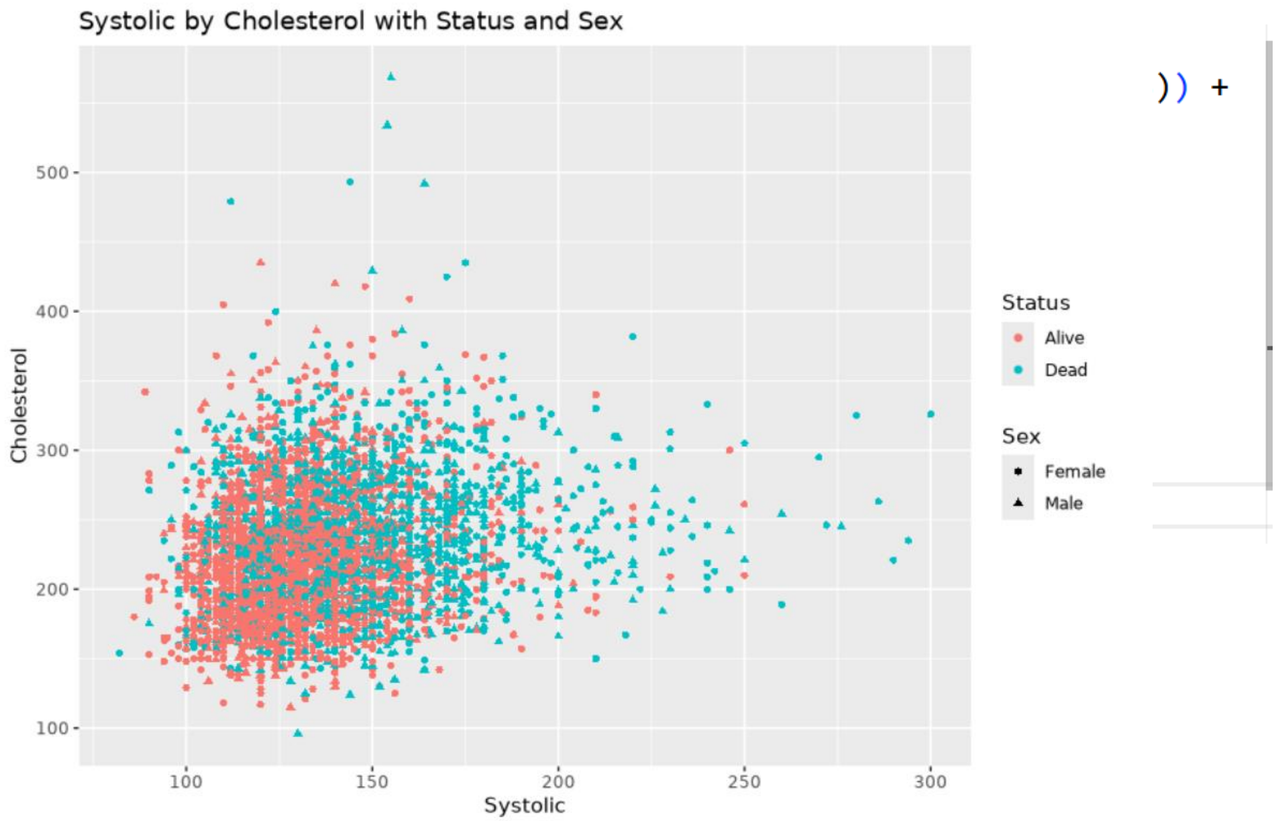
Graphics to the Results Window

- For graphics, save the plot object, then use rplot() to direct the output to the Results window

```
1   %let inputTable = SASHELP.HEART
2   %let X = Systolic;
3   %let Y = Cho
4   %let Color =
5   %let shape =
6
7   PROC R;
8   submit;
9
10  library(ggpl
11  # Read in Ma
12  # sym strips
13  df= sd2df(sy
14  plotX = sym(
15  plotY = sym(
16  plotC = sym(
17  plotS = sym(symget("shape"))
18
```

```
18
19      plt = g
20          geom_
21          labs
22
23
24
25      rplot(p
26
27      endsubm
28      RUN;
```

og Results Output Data



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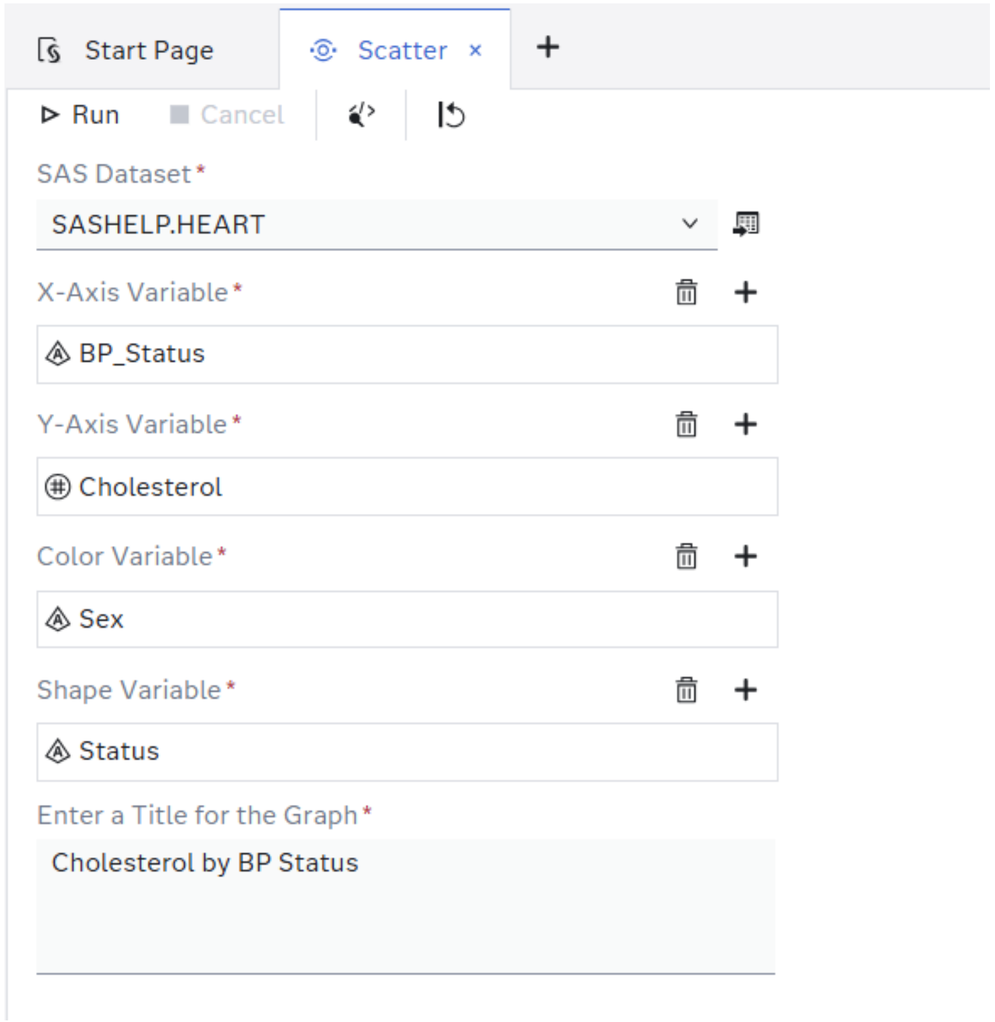
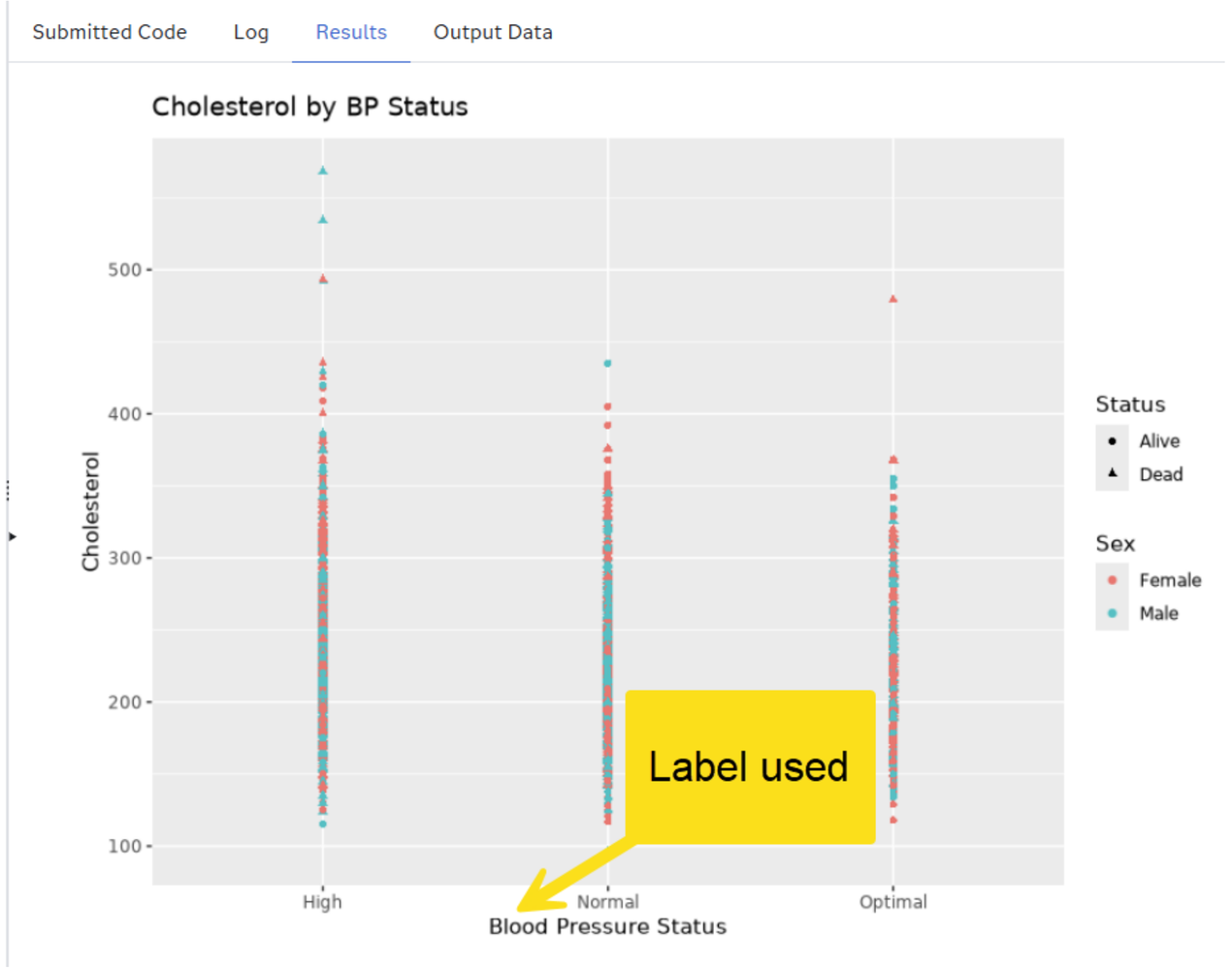
R Code in a SAS Custom Step





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Setup & Packages

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How does this get installed

SAS Open-Source Configurator

```
- op: replace
  path: /data/default_r.r_tarball
  value: https://cloud.r-project.org/src/base/R-4/R-4.4.3.tar.gz
- op: replace
  path: /data/default_r.packages
  value: "R6 dplyr jsonlite httr tidyverse randomForest xgboost forecast arrow logger knitr haven svglite plotly"
- op: replace
  path: /data/default_r.pkg_repos
  value: "https://cran.rstudio.com/ http://cran.rstudio.com/ https://cloud.r-project.org/ http://cloud.r-project.org/"
target:
```

Point to R tar file

list your packages

identify repo locations

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