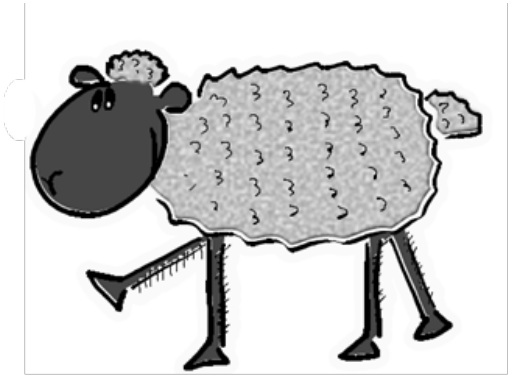
How to Create SAS packages

Ryo Nakaya



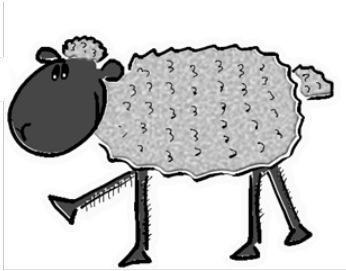
What is SAS Packages?

- SAS macros, functions, data, etc. are packaged in a unified form using SAS Packages Framework (SPF).
  https://github.com/yabwon/SAS_PACKAGES
- Package can be created and shared like R
- SASPAC (SAS Packages Archive) Repository
  https://github.com/SASPAC

SAS packages were developed by Bartosz Jablonski * in 2019 and the number of users has been increasing in recent years

*Takeda pharmaceutical, Warsaw University of Technology, yabwon

How to Create SAS Packages



developer

1. Loading SPF (Setup)
   - > next slide(3 lines only!)

1.5. Create a hex logo with ChatGPT, etc.!!

2. Creating Source Files and Folders for a Package
   - > To be explained in the following slides

3. Execute the% generatePackage () macro

This will result in the creation of a [packagename] .zip file (package file)

```
%generatePackage(
        filesLocation = C:¥your¥packages¥folder, /* location of the files/folders created above */
        markdownDoc = 1,                         /* Create .md file*/
        easyArch = 1                             /* create archive files of .zip and .md */
)
```

There are other parameters related to tests, etc. at the time of package preparation.

SPF Setup

```
filename packages "¥Your¥Folder¥";
filename SPFinit url "https://raw.githubusercontent.com/yabwon/SAS_PACKAGES/main/SPF/SPFinit.sas";
%include SPFinit;
%installPackage(SPFinit)
```

Once SPFinit.sas is downloaded to the location of packages using the above% installPackage (SPFinit), the following is OK

```
filename packages "¥Your¥Folder¥";
%include packages(SPFinit);
```

https://github.com/yabwon/SAS_PACKAGES/blob/main/SPF/Documentation/HelloWorldPackage.md

Installation and Loading Examples

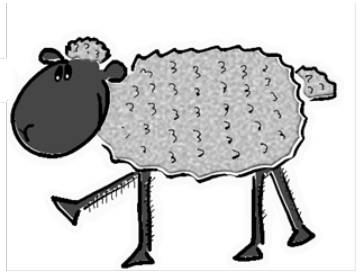
```
%installPackage(baseplus)
%installPackage(SASPACer, sourcePath = https://github.com/Nakaya-Ryo/SASPACer/raw/main/)
%installPackage(RWDExpress(0.0.1), github = Narusawa-T)

%loadPackage(baseplus)
%loadPackage(SASPACer)
```

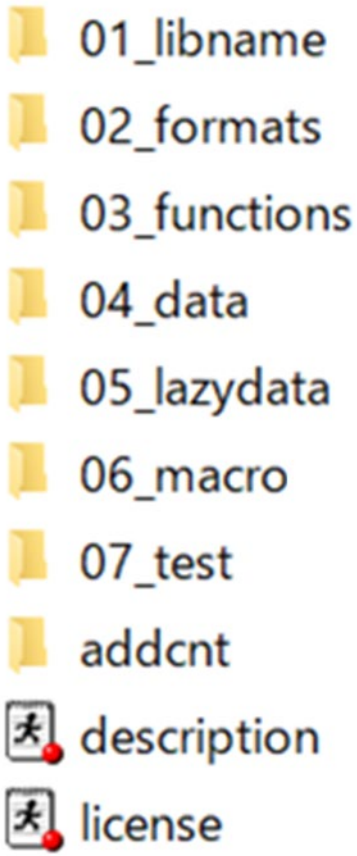
%loadPackage () looks like library () in R.

Source file folder for package

- Standard Configuration



developer

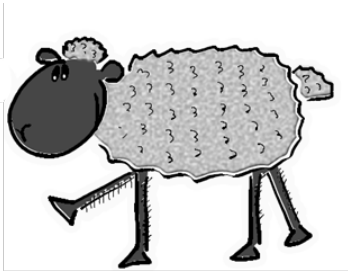


- Sequential number (for order of execution at the time of package creation)
- Object type (e.g. macro) at end
- Test is the test code at the time of package creation
- Only numbers, “_ ” and lower case letters
- Any files other than .sas files are ignored (except for addcnt).
- Addcnt (Additional contents) will be included in the package
- “description.sas ” should be an essential file, and“ license.sas ” should be created (to be explained on a later page)

https://github.com/yabwon/SAS_PACKAGES/blob/628641a6cfb6c5cf900283e9db450c7fe0e386e9/SPF/Documentation/Paper_1079-2021/My%20First%20SAS%20Package%20-%20a%20How%20To.pdf

https://github.com/yabwon/SAS_PACKAGES/blob/main/SPF/Documentation/HelloWorldPackage.md

Source file folder for package



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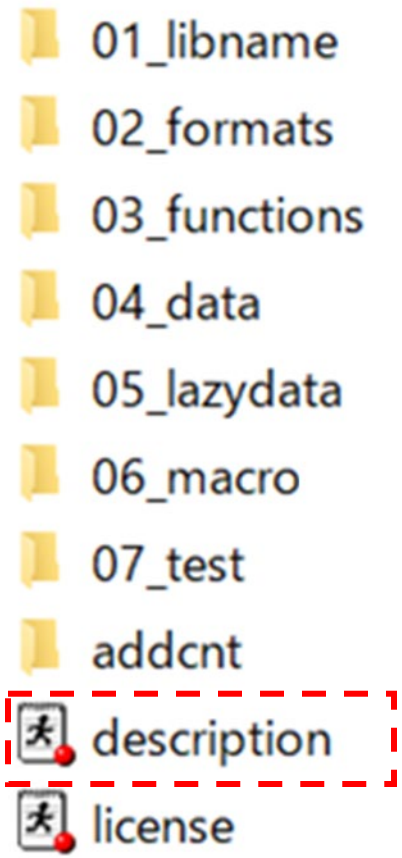
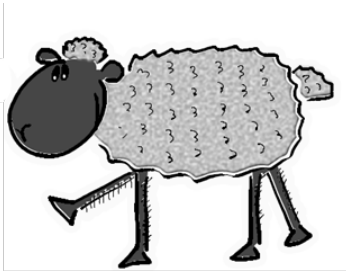
- Examples of sas file content in each folder




```
Type : Package
Package : testPackage
Title : Test package
Version : 0.0.1
Author : Taro Sasu(taro.sasu@mail.com)
Maintainer : Taro Sasu(taro.sasu@mail.com)
License : MIT
Encoding : UTF8
Required : "Base SAS Software"
ReqPackages : "List any SAS packages required here"

DESCRIPTION START:

## The testPackage ##
The test package is to show how the package is created
You can describe package information here

DESCRIPTION END:
```

Fill in the package information in this format such as type

Source file folder for package



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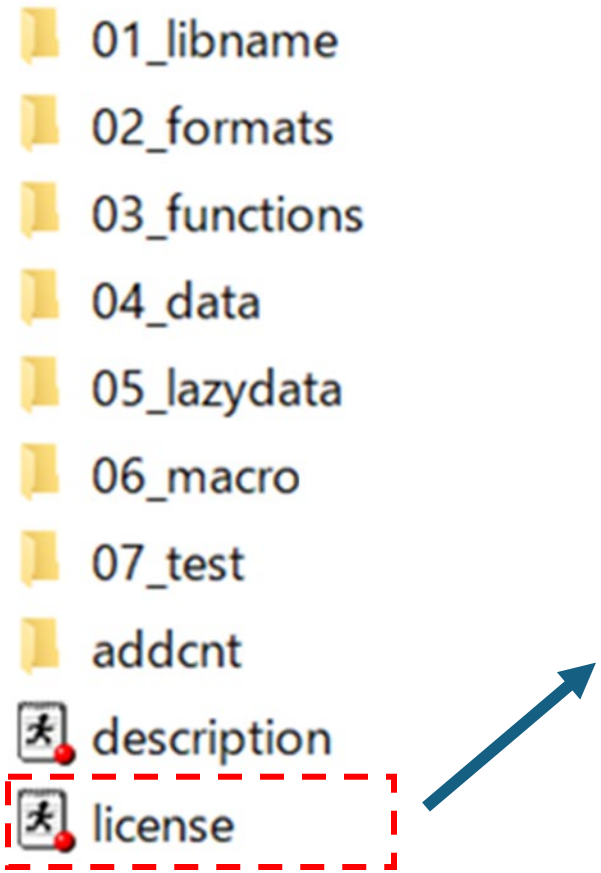
- Examples of sas file content in each folder



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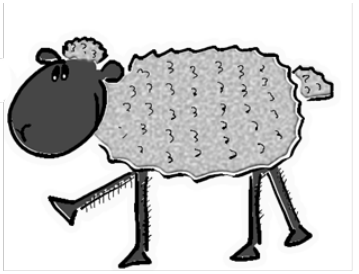
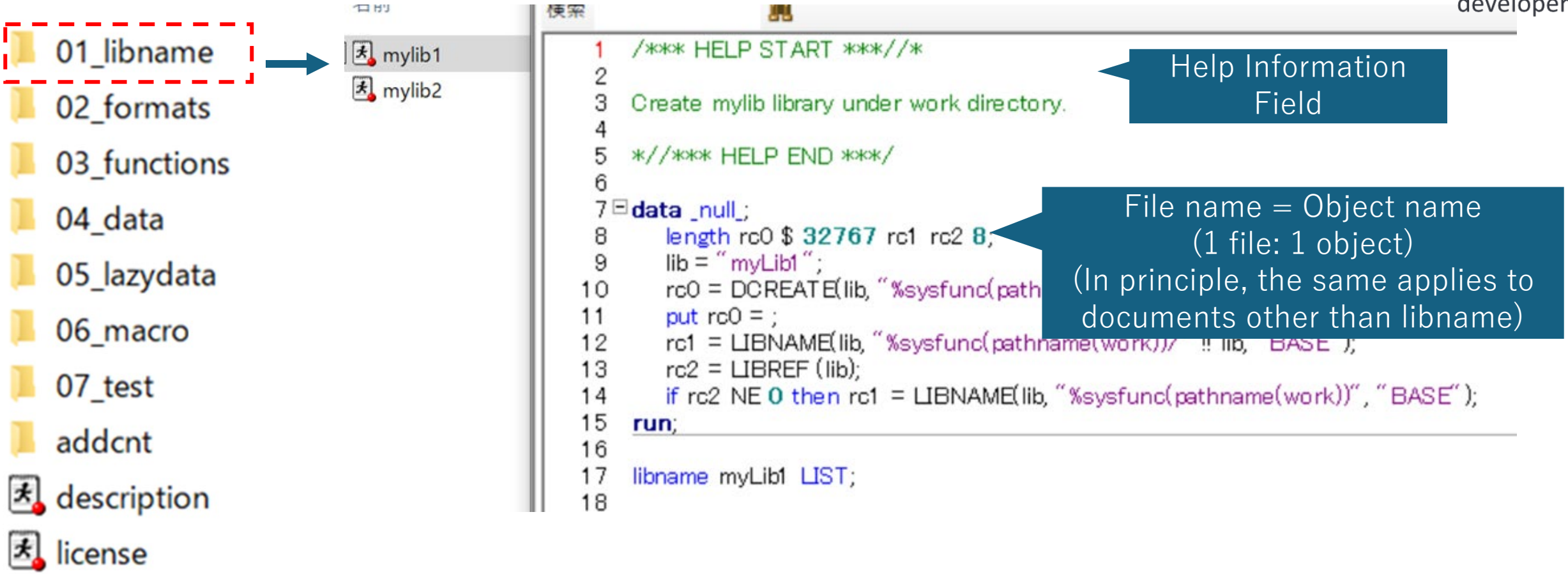
Standard text in the MIT License (if liscense.sas file is not present, the MIT standard text is prepopulated.)

Source file folder for package

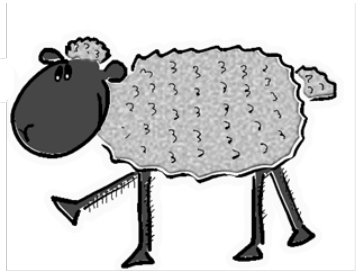


developer

- Examples of sas file content in each folder

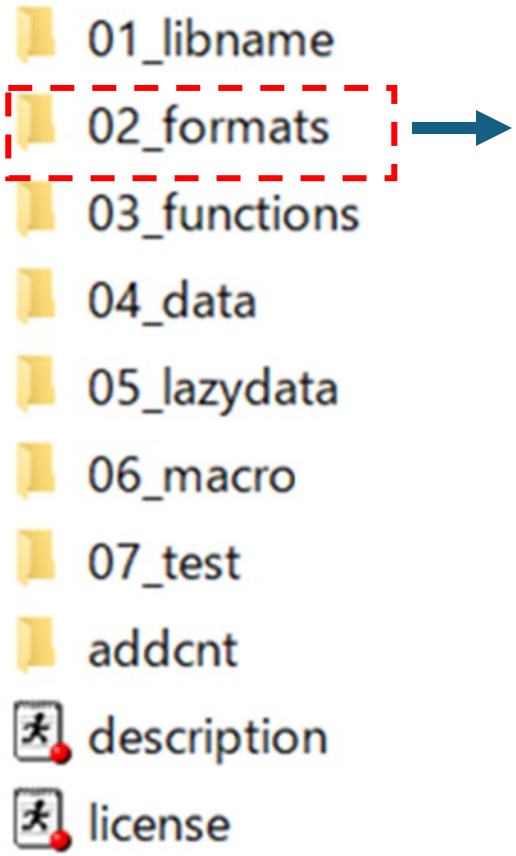


Source file folder for package



developer

- Examples of sas file content in each folder




```
1  /*** HELP START ***//*
2
3  This is a format.
4  Proc format ; and run ; are not needed within SASPAC framework.
5
6  *//*** HELP END ***/
7
8      value fmtNum
9          low -< 0 = "negative"
10         0 = "zero"
11         0 <- high = "positive"
12         other = "missing"
13     ;
```

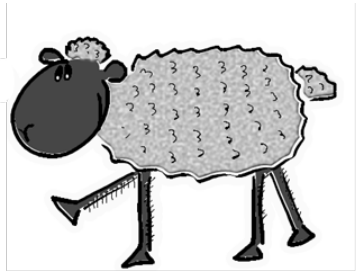
Help Information Field

It is impossible to describe Proc format; and run; (Describe only the contents)

Formats does not need to be 1 file: 1 object.

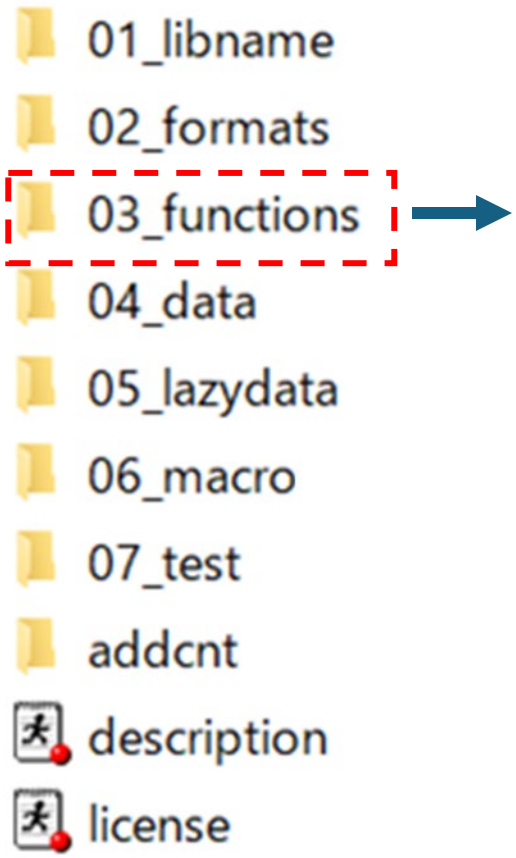
Note: A folder structure of format (without s) is possible, but the format folder was historically created earlier and should contain a proc format lib = work. & packageName.format; and run; (Formats is usually more convenient.)

Source file folder for package



developer

- Examples of sas file content in each folder




```
1   /*** HELP START ***//*
2
3   F1 is an user-defined function to output +1 value.
4   Proc fcmp outlib=work.f.p ; and run ; are not needed in
5   options cmplib=work.f ; is required prior to f1 is used.
6
7   *//*** HELP END ***/
8
9       function F1(n);
10          return (n+1 );
11      endsub;
```

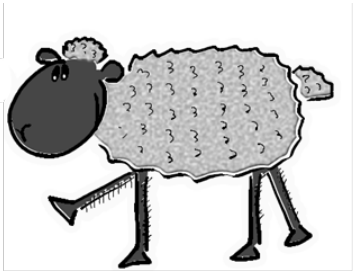
Help Information Field

It is impossible to describe Proc fcmp; and run; (Describe only the contents)

For Functions, 1 file: 1 object is not required.

Note: A folder structure of function (without s) is possible, but the function folder was historically created earlier and should contain proc fcmp outlib = work. & packageName.fcmp.package; and run; (I usually prefer the functionss folder.)

Source file folder for package



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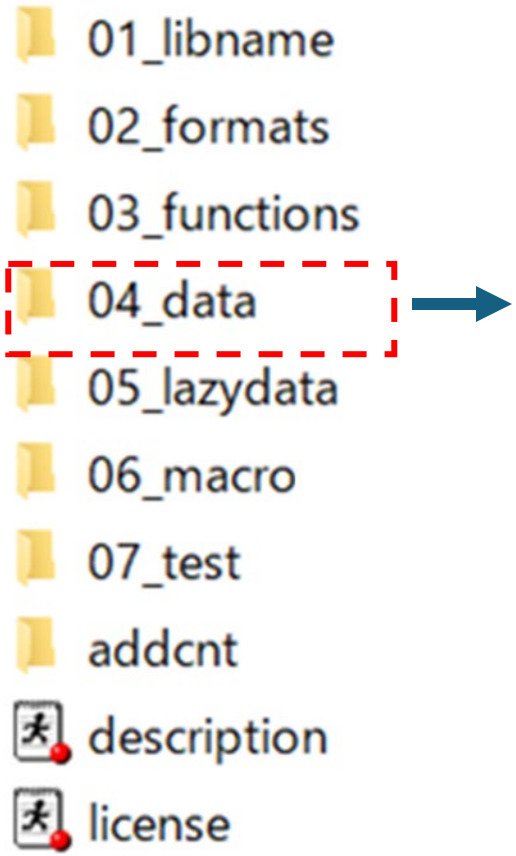
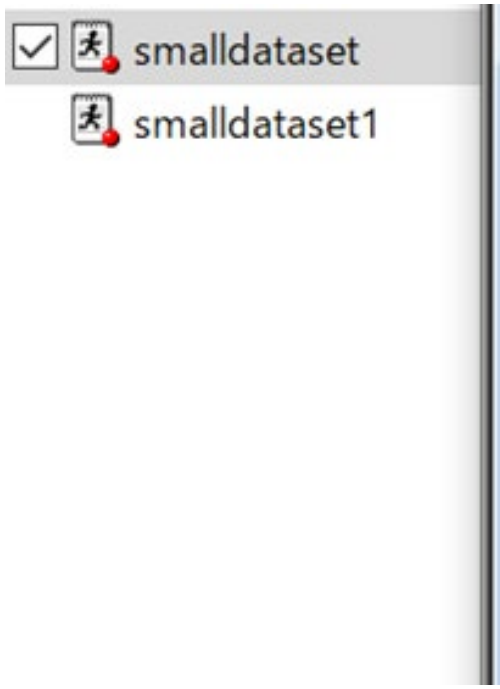
- Examples of sas file content in each folder



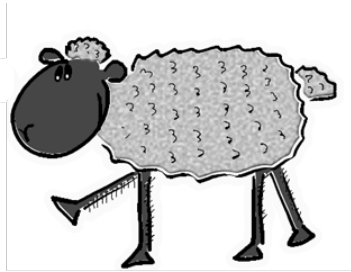



```
1  /*** HELP START ***//
2
3  This is a small dataset.
4
5  *//*** HELP END ***/
6
7  data myLib1.smallDataset;
8      do n = ., -1, 0, 1;
9          m = put(n, fmtNum.);
10     output;
11     end;
12 run;
```

Help Information Field

Using mylib1 library defined in 01_libname and fmtNum format defined in 02_formats (so folders are numbered sequentially)

Source file folder for package



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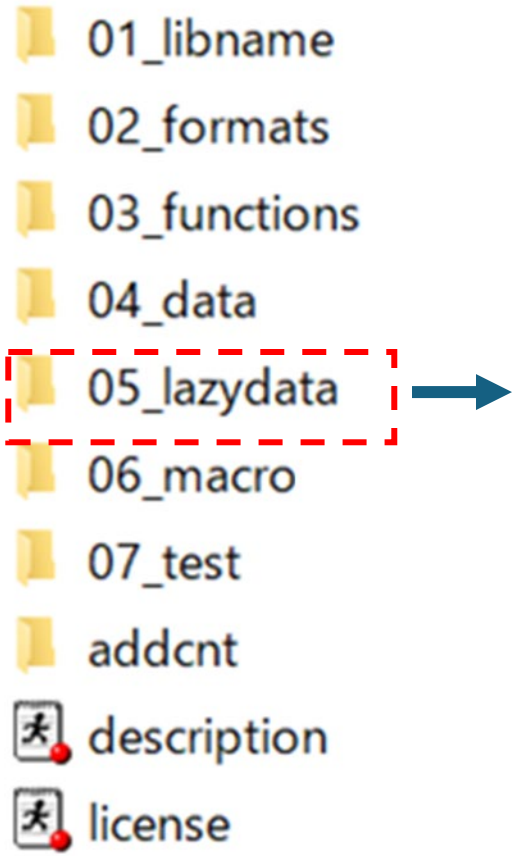
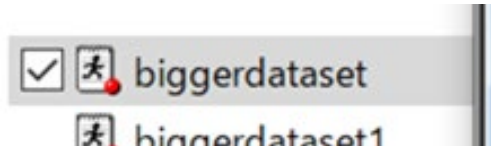
- Examples of sas file content in each folder



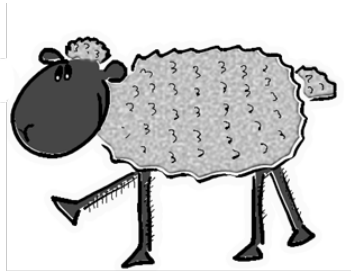



```
1  /*** HELP START ***//*
2
3  This is a bigger dataset.
4
5  *//*** HELP END ***/
6
7  data myLib1.biggerDataset;
8      do i = ., -1e6 to 1e6;
9          j = put(i, fmtNum.);
10         k = ranuni(17);
11     output;
12     end;
13 run;
```

Help Information Field

The file is not loaded unless lazyData = is specified in% loadPackage ().

Source file folder for package



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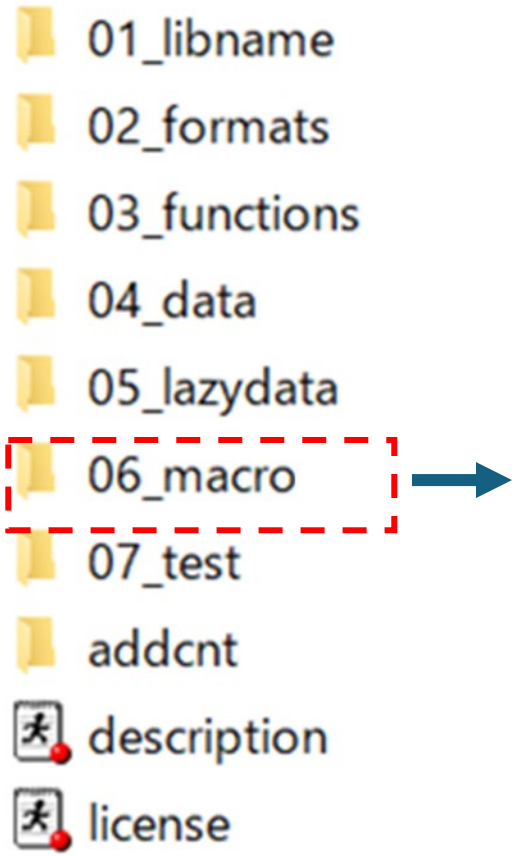
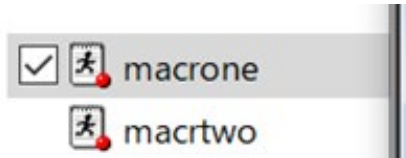
- Examples of sas file content in each folder



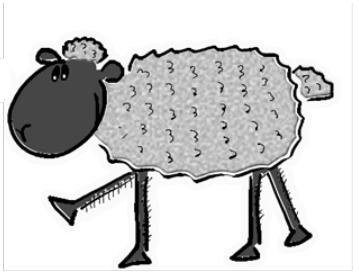



```
1  /*** HELP START ***//*
2
3  This is mcrOne macro.
4
5  *//*** HELP END ***/
6
7  %macro mcrOne();
8      %put **Hi! This is macro &sysmacroname.**;
9      data _null_;
10         set myLib1.smallDataset;
11         p = f1(n);
12         p + f2(n);
13         put (n p) (= fmtNum.);
14     run;
15 %mend mcrOne;
16
```

Help Information Field

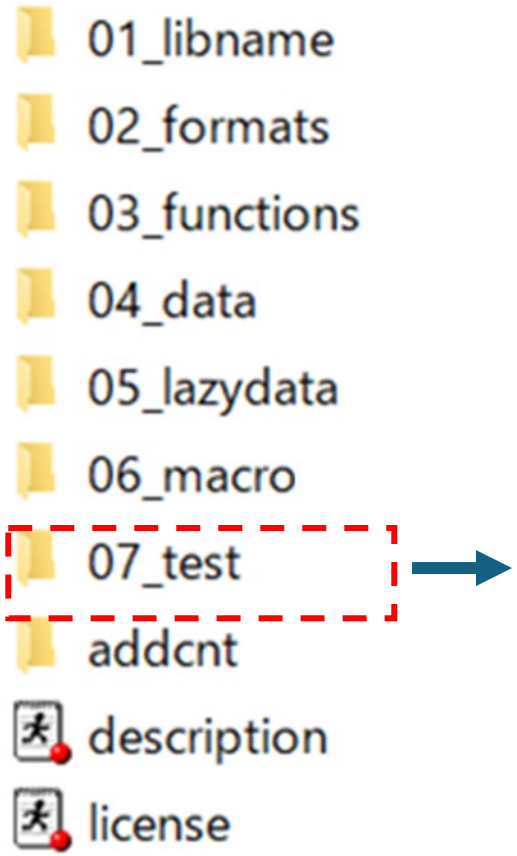
Macro plays a leading role in package!!

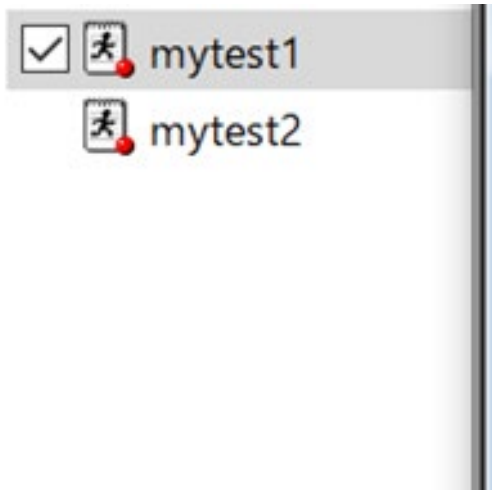
Source file folder for package



developer

- Examples of sas file content in each folder





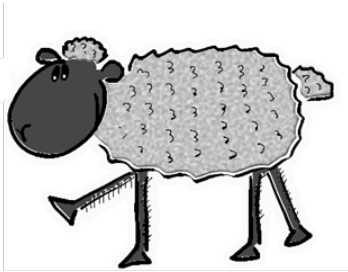

```
1  /*** HELP START ***//*
2
3  This is a test.
4
5  *//*** HELP END ***/
6
7  %mcrTwo(m=mcrOne)
8
```

Help Information Field

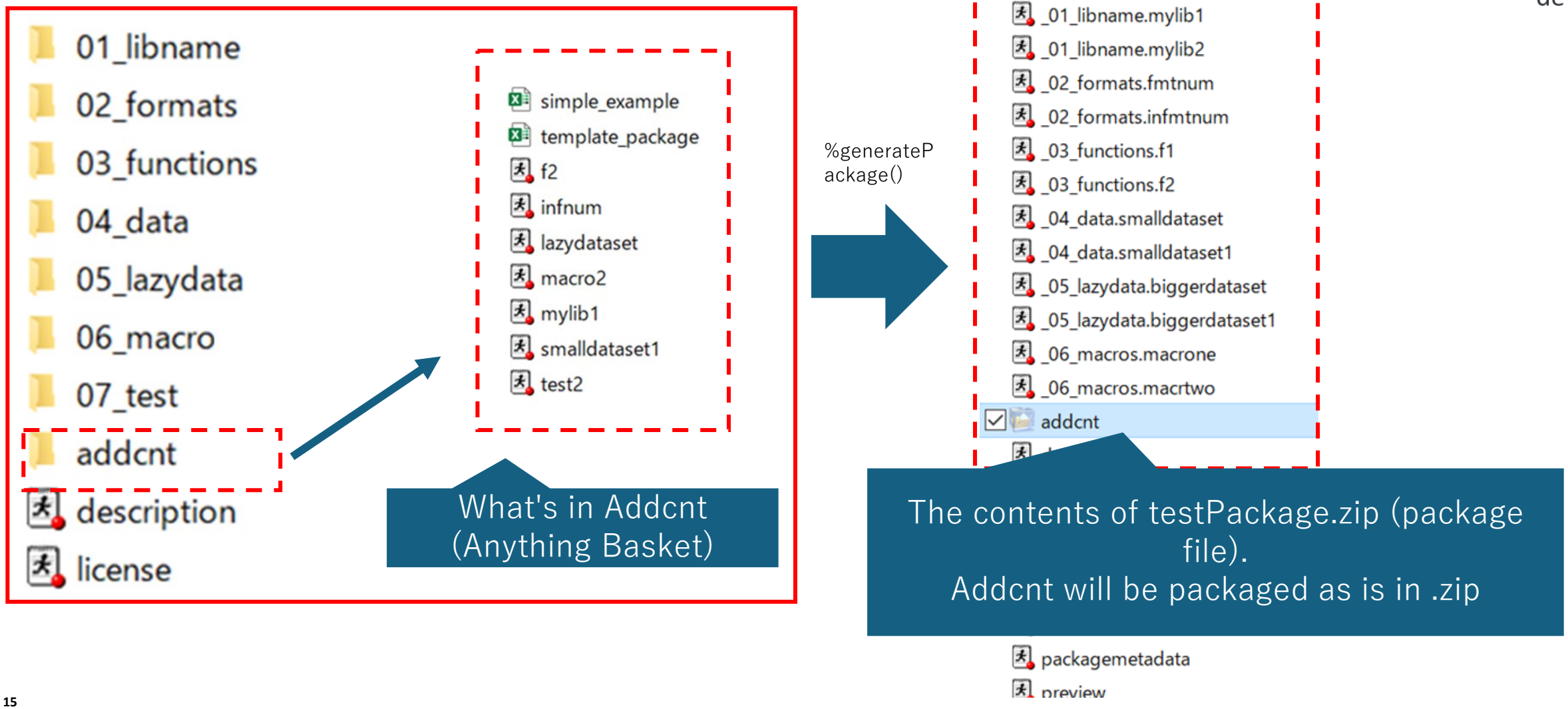
If testPackage = Y (default) is selected in% generatePackage (), the test is executed when the package is created.

Source file folder for package

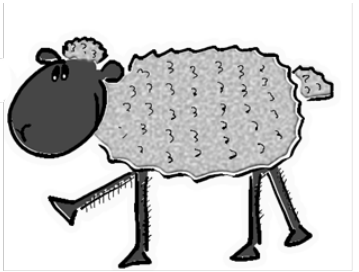
- Additional Contents(Addcnt)



developer



Output of %generatePackage ()



developer

- 01_libname
- 02_formats
- 03_functions
- 04_data
- 05_lazydata
- 06_macro
- 07_test
- addcnt
- description
- license
- testpackage
- testpackage
- testpackage_0.0.1_
- testpackage_0.0.1_

Source folder file (input data to be placed in% generatePackage ())

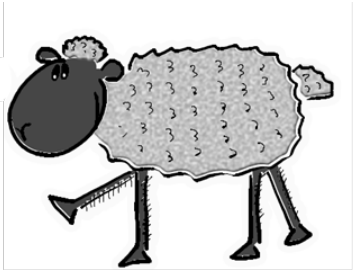
testPackage.md
(Markdown document based on description and help information)

Package body (.zip), instructions (.md), archive copy (_version)
(Output data from% generatePackage ())

- _01_libname.mylib1
- _01_libname.mylib2
- _02_formats.fmtnum
- _02_formats.infmtnum
- _03_functions.f1
- _03_functions.f2
- _04_data.smalldataset
- _04_data.smalldataset1
- _05_lazydata.biggerdataset
- _05_lazydata.biggerdataset1
- _06_macro.macrone
- _06_macro.macrtwo
- addcnt
- description
- help
- iceloadpackage

Contents of testPackage.zip (package body)

Options to create SAS packages



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1. Manually create source files and folders and run %generatePackage
   You can copy existing source packages(e.g. Adamski) as a start point
2. Use SASPACer
3. Use SASPACerShiny and run %generatePackage
4. Ask Oba-chan(SAS Package Lady) to cook source files and folders and run %generatePackage

how_to_create_example_SAS_package.sas

SASPACer

- Package for **Creating SAS package in one step**
  (A mechanism that you can generally understand when you look at Sample in Excel)
  https://github.com/PharmaForest/SASPACer
  - **%ex2pac(), %pac2ex()**

Type	Package
Package	testPackage
Title	My first SAS package
Version	0.0.1
Author	John Smith(john.smith@mail.com)
Maintainer	John Smith(john.smith@mail.com)
License	MIT
Encoding	UTF8
Required	"Base SAS Software"
ReqPackage	"Baseplus (2.1.0)"
Description	## The myPackage ## The `myPackage` is my first SAS package. ### References ### 1. Bartosz Jablonski. "My First SAS Package - a How To". SGF

description | license | 01_libname | 02_forma

name	help	body	location
mcrone	This is mcrOne macro. (No need to write location column if content is written in body column.)	%macro mcrOne(); %put **Hi! This is macro &sysmacroname.**; data _null_; set myLib.smallDataset; p = f1(n); p + f2(n); put (n p) (= fmtNum.); run; %mend mcrOne;	
mcrtwo	This is mcrTwo macro. (No need to write body column if content is in a file written in location column, SASPACer reads the file.)		C:¥temp¥addcnt¥mcrtwo.sas

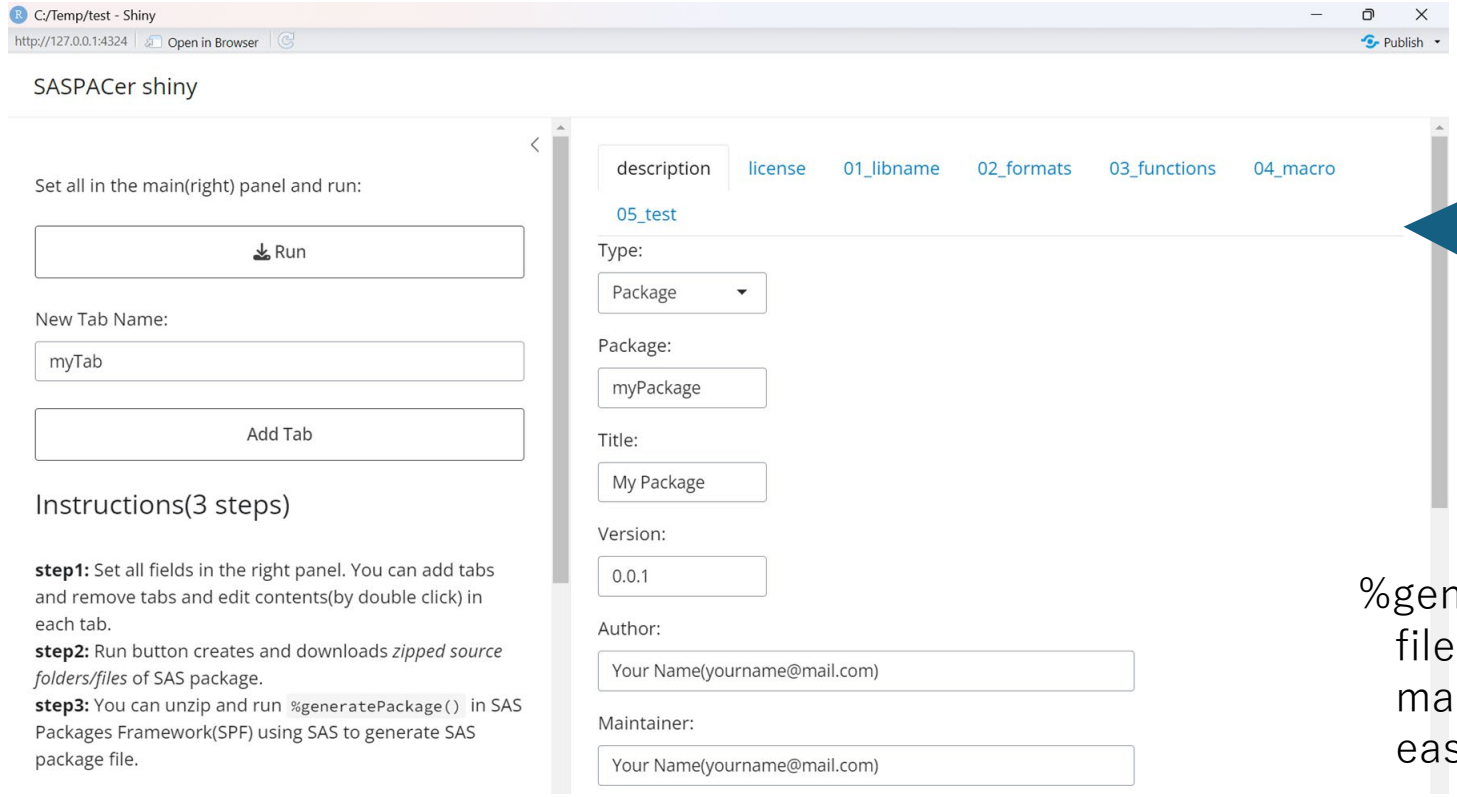
02_formats | 03_functions | 04_data | 05_lazydata | 06_macro | 07_test

```
%ex2pac(
    excel_file = ¥folder¥to¥excel_file.xlsx,
    package_location = ¥folder¥for¥output,
    complete_generation = Y
)
```

Output source folder files and package files as input in Excel.
There is no need to create a folder or file!

SASPACerShiny

- For **SAS Package Creation using Rshiny**
  R package (Shiny application)
  https://github.com/PharmaForest/SASPACerShiny



Set up source folder files in the graphical user interface
Download and run %generatePackage() separately

```
%generatePackage(
  filesLocation = ¥path¥to¥source¥package¥folder,
  markdownDoc = 1,
  easyArch = 1)
```

SAS Package Lady

- The aunty who cooks SAS Package interactively
  https://chatgpt.com/g/g-68be12f679a88191866ef1e9b35be3c4-sas-package-lady

- Support details
  - Listens to package information
  - Can add help information when uploading macro files, etc.
  - The system outputs the source package (folder and file structure)
  - They also help me create logos
- Requires chatGPT sign-up (free version OK)

Your aunt will create the source package, download it, and run %generatePackage() separately.

```
%generatePackage(
  filesLocation = ¥path¥to¥source¥package¥folder,
  markdownDoc = 1,
  easyArch = 1)
```


Enjoy!!

References

- SAS Packages: The Way to Share (a How To), SAS Global Forum 2020, Bartosz Jablonski
  https://www.sas.com/content/dam/SAS/support/en/sas-global-forum-proceedings/2020/4725-2020.pdf
- SASPAC(SAS Packages Repository)
  https://github.com/SASPAC
- Modern graph package “SAS plotter,” SAS User Group Conference Japan 2024, Kosuke Tsutsugo
  https://github.com/SASPAC/sasplotter
- Integration of SAS GRID environment and SF-36 Health Survey scoring API with SAS Packages, PharmaSUG 2024, Bartosz Jablonski
  https://pharmasug.org/wp-content/uploads/2024/06/PharmaSUG-2024-SD-262.pdf
- SASPAC - Introduction of a certain Github archive-, The 10th Osaka SAS Study Group 2024, Ryo Nakaya,
  https://sites.google.com/view/osakasasbenkyokai/%E7%AC%AC10%E5%9B%9E
- SASPAC2 - Examination of Real World Data acceleration tool -, The 11th Osaka SAS Study Group 2025, Teruko Narusawa,
  https://sites.google.com/view/osakasasbenkyokai/%E7%AC%AC11%E5%9B%9E
- PharmaForest
  https://github.com/PharmaForest
- SASPACer
  https://github.com/Nakaya-Ryo/SASPACer
- SASPACerShiny
  https://github.com/Nakaya-Ryo/SASPACerShiny
- SAS Package Lady
  https://chatgpt.com/g/g-68be12f679a88191866ef1e9b35be3c4-sas-package-lady
- RWDExpress
  https://github.com/Narusawa-T/RWDExpress