

# SAS Studio: Flows & Steps

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# SAS Studio

## Flow History


- Enterprise Guide from the very beginning utilized a concept of a Process Flow
- Many users have become accustomed to creating lengthy and sometimes complex Flows
- Some users only had one or two types of tasks in their Flows – programs and the Query Builder
- Enterprise Guide 8.x does not require a Project or Process Flows
- Flows and Steps were introduced to SAS Studio in April of last year
- Custom Steps were added shortly thereafter as part of CD/CI in Viya

# SAS Studio


- SAS Studio supports different levels of functionality depending on the license you have
- This added functionality shows up as specific Steps
- Steps are like Tasks but usually more targeted to one activity
- Steps are used in building SAS Studio Flows
- Users can create Custom Steps – there is a growing number of these that are on Github

# SAS Studio

## Check your version



About



Product name: SAS® Studio (Analyst)

Version: Stable 2021.1.3

Release: 20210803.1628009574747

Site name: SSE DEMOCENTER VDSO AIOT PQA 04 19 2021

Site number: 70180938

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Close

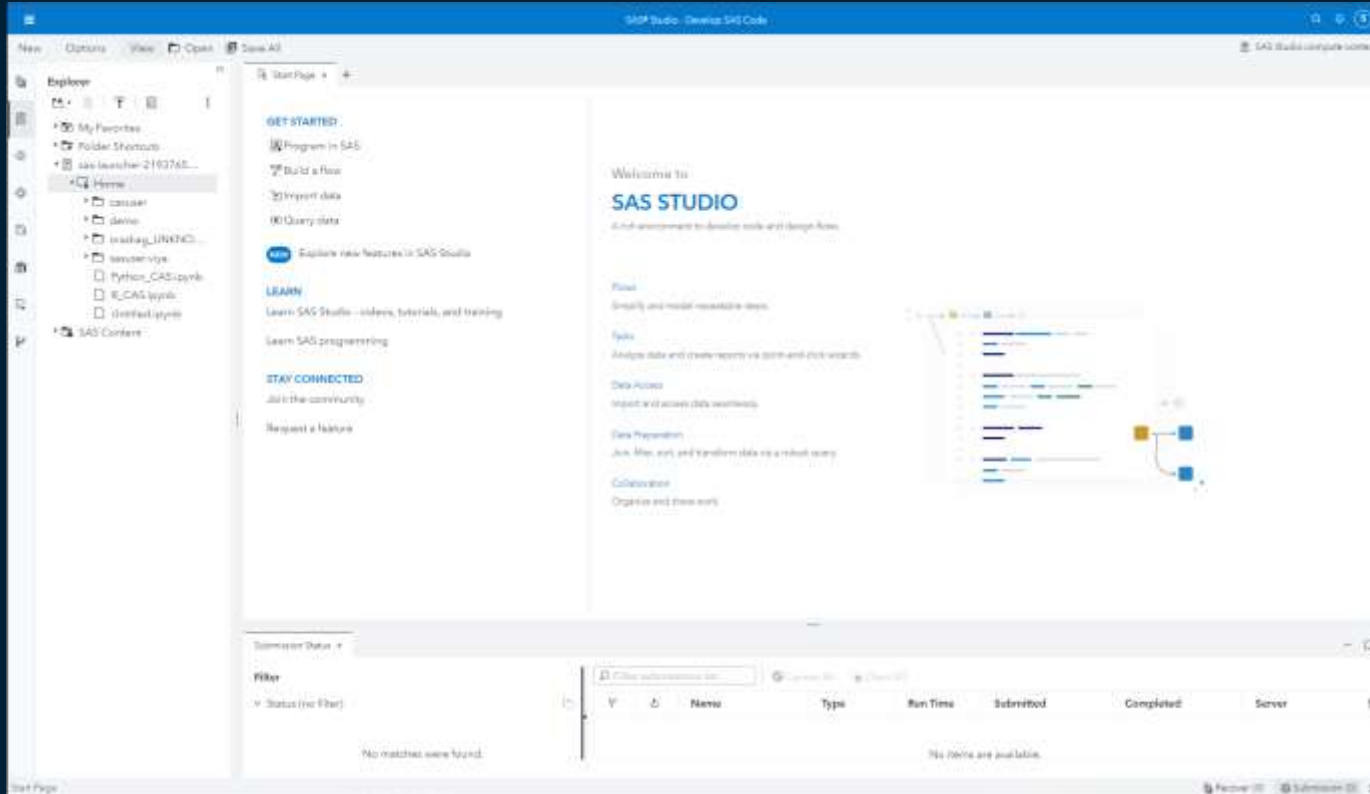
# SAS Studio

## Start Page

The screenshot displays the SAS Studio Start Page. The top navigation bar includes 'New', 'Options', 'View', 'Open', and 'Save All'. The left sidebar contains an 'Explorer' panel with 'My Favorites', 'Folder Structure', 'see launcher(2195765...)', and 'SAS Content'. The main content area is divided into three sections: 'GET STARTED' with links to 'Program in SAS', 'Build a Flow', 'Import data', 'Query data', and 'Explore new features in SAS Studio'; 'LEARN' with links to 'Learn SAS Studio - videos, tutorials, and training' and 'Learn SAS programming'; and 'STAY CONNECTED' with links to 'Join the community' and 'Request a feature'. The right side features a 'Welcome to SAS STUDIO' message, a description 'A rich environment to develop code and design flows', and a list of capabilities: 'Flow' (Simplify and model repeatable steps), 'Tasks' (Analyze data and create reports via point-and-click wizards), 'Data Access' (Import and access data seamlessly), 'Data Preparation' (Join, filter, sort, and transform data via a robust query), and 'Collaboration' (Organize and share work). A diagram on the right illustrates a data flow from a source to a target. At the bottom, a 'Submission Status' panel shows a filter for 'Status (no filter)' and a table with columns: Name, Type, Run Time, Submitted, Completed, and Server. The table is currently empty, displaying 'No matches were found.' and 'No items are available.'

# SAS Studio

File system access as well as SAS Content



# SAS Studio

## Built-In Tasks

The screenshot displays the SAS Studio interface. On the left, the 'Tasks' pane lists various built-in tasks categorized under 'SAS Viya Cloud Analytic Services', 'SAS Viya Environments', 'SAS Viya Evaluate and Implement Machine Learning', 'SAS Viya Forecasting', 'SAS Viya Machine Learning', 'SAS Viya Optimization and Network', 'SAS Viya Prepare and Explore Data', 'SAS Viya Statistics', 'SAS Viya Text Analytics', 'Statistical Process Control', 'Statistics', 'Cluster Analysis', 'Combinatorics and Probability', 'Descriptive', 'Correlation Analysis', 'Data Exploration', 'Distribution Analysis', 'One-Way Frequencies', 'Summary Statistics', 't-Test', and 'Table Analysis'. The main area shows the 'Start Page' with a 'GET STARTED' section containing links to 'Program in SAS', 'Build a flow', 'Import data', and 'Query data'. Below this is a 'LEARN' section with links to 'Learn SAS Studio', 'Learn SAS programming', and 'Request a feature'. A 'STAY CONNECTED' section is also present. The bottom of the interface shows a 'Submission Status' table with columns for Filter, Name, Type, Run Time, Submitted, Completed, and Server. The table is currently empty, showing 'No matches were found' and 'No items are available'.

# SAS Studio

## Snippets

The screenshot shows the SAS Studio interface with the Snippets pane open on the left. The pane is titled 'Snippets' and has a search bar. Below the search bar, there are two tabs: 'SAS Snippets' and 'My Snippets'. The 'SAS Snippets' tab is selected, and it shows a list of snippets categorized by icons. The categories are: Data, Data Quality, Description, Graph, IML, Macro, and SAS Viya Cloud Analytic Services. Each category has a list of snippets, such as 'DS2 Code', 'DS2 Package', 'DS2 Thread', 'Generate CSV File', 'Generate PowerPoint Slide', 'Generate XML File', 'Import CSV File', 'Import R/EX File', 'Simulate Linear Regression Data', 'Simulate One-Way ANOVA Data', 'Data Quality', 'Description', 'Graph', 'IML', 'Macro', 'SAS Viya Cloud Analytic Services', 'Create CAS Connection', 'Delete caslib', 'Delete Table on File from caslib', 'Disconnect CAS Session', 'Generate SAS Objects for caslib', 'List CAS Session Options', 'List CAS Sessions for SAS Cloud', 'List CAS Sessions for User ID', 'Load Data to caslib', 'New CAS Session', 'New caslib for Path', 'Reconnect CAS Session', and 'Save Table to caslib'.

The main area of the SAS Studio interface shows the 'Start Page' with a 'GET STARTED' section, a 'WELCOME TO SAS STUDIO' message, and a 'LEARN' section. The 'GET STARTED' section includes links to 'Program in SAS', 'Build a Flow', 'Import data', and 'Query data'. The 'WELCOME TO SAS STUDIO' message includes a link to 'Explore new features in SAS Studio'. The 'LEARN' section includes links to 'Learn SAS Studio - videos, tutorials, and training', 'Learn SAS programming', 'Join the community', and 'Request a feature'. The 'Data' section includes links to 'Data flows', 'Data Preparation', and 'Collaboration'. The 'Data flows' section includes a link to 'Data flows' and a description: 'Analyze data and create reports via point-and-click wizards'. The 'Data Preparation' section includes a link to 'Data Preparation' and a description: 'Join, filter, sort, and transform data via a visual query'. The 'Collaboration' section includes a link to 'Collaboration' and a description: 'Organize and share work'. The bottom of the interface shows a 'Submission Status' pane with a search bar and a table of submission status. The table has columns for 'Name', 'Type', 'Run Time', 'Submitted', 'Completed', and 'Server'. The table is currently empty, and a message 'No matches were found.' is displayed.



# SAS Studio

## Libraries

The screenshot shows the SAS Studio interface. On the left, the 'Libraries' pane is open, displaying a tree view of available libraries: LIBRARIES, MAPS, MAPSGRFX, MAPSSAS, SASHELP, SASUSER, and WORK. The 'WORK' library is selected. The main area shows the 'Start Page' with a 'GET STARTED' section containing links for 'Program in SAS', 'Build a flow', 'Import data', and 'Query data'. Below this is a 'LEARN' section with links for 'Explore new features in SAS Studio', 'Learn SAS Studio videos, tutorials and training', and 'Learn SAS programming'. The 'STAY CONNECTED' section includes links for 'Join the community' and 'Request a feature'. The right side of the main area features a 'Welcome to SAS STUDIO' message and a 'Flow' diagram. The bottom pane shows the 'Submission Status' tab, which is currently empty, displaying a message 'No matches were found.'

Submission Status

Filter:

Status (no filter)

Name	Type	Run Time	Submitted	Completed	Server
No matches were found.					

# SAS Studio

## File References

The screenshot displays the SAS Studio web interface. On the left, the 'File References' pane is active, showing a list of actions: 'Programs in SAS', 'Build a flow', 'Import data', 'Query data', and a 'NEW' section for 'Explore new features in SAS Studio'. Below these are 'LEARN' links for 'SAS Studio - videos, tutorials, and training' and 'SAS programming', and 'STAY CONNECTED' links for 'Join the community' and 'Request a feature'. The main area is the 'Start Page', which includes a 'Welcome to SAS STUDIO' message and a description: 'A rich environment to develop code and design flows.' It lists several key features: 'Flow' (Simplify and model repeatable steps), 'Tasks' (Analyze data and create reports via point-and-click wizards), 'Data Access' (Import and access data seamlessly), 'Data Preparation' (Join, filter, sort, and transform data via a robust query), and 'Collaboration' (Organize and share work). A diagram on the right illustrates a data flow process. At the bottom, the 'Submission Status' pane is visible, showing a filter for 'Status (no filter)' and a table with columns: Name, Type, Run Time, Submitted, Completed, and Server. The table currently shows 'No matches were found.'

Name	Type	Run Time	Submitted	Completed	Server
No matches were found.					

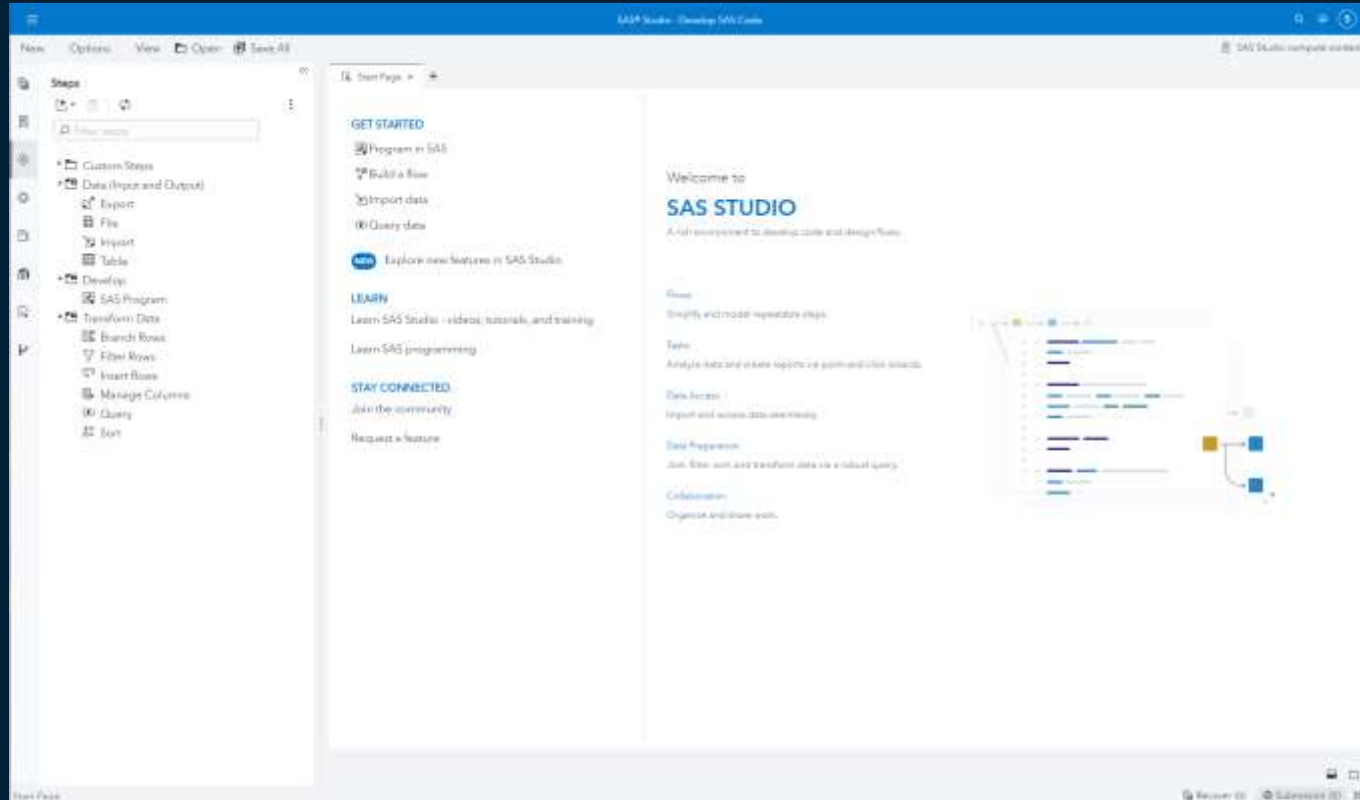
# SAS Studio

## GIT Repositories

The screenshot displays the SAS Studio web interface. The top navigation bar includes 'New', 'Options', 'View', 'Open', and 'Save All'. The main content area is titled 'Git Repositories' and features a 'Start Page' tab. On the left sidebar, under 'Git Repositories', there is a button 'ADD OR CLONE A GIT REPOSITORY.' and a message 'No items are available.' Below this, there are links for 'Add Repository' and 'Clone Repository'. The main content area is divided into three sections: 'GET STARTED' with links for 'Program in SAS', 'Build a flow', 'Import data', and 'Query data'; 'LEARN' with links for 'Explore new features in SAS Studio', 'Learn SAS Studio - videos, tutorials, and training', and 'Learn SAS programming'; and 'STAY CONNECTED' with links for 'Join the community' and 'Request a feature'. On the right, there is a 'Welcome to SAS STUDIO' message and a 'Data Access' section with a diagram showing data flow. At the bottom, there is a 'Submission Status' section with a search bar and a table with columns: Name, Type, Run Time, Submitted, Completed, and Server. The table is currently empty, with a message 'No matches were found.'

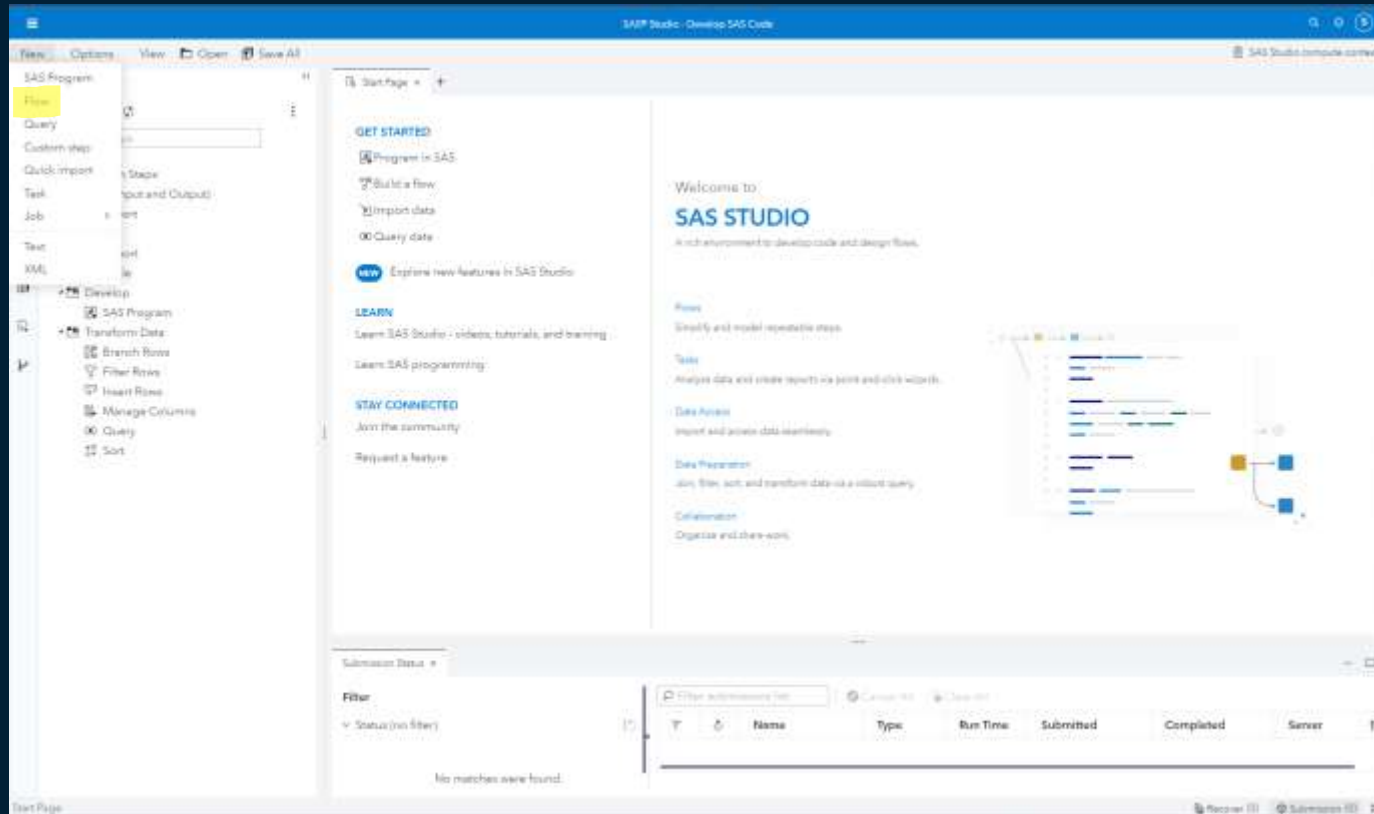
# SAS Studio

## Steps



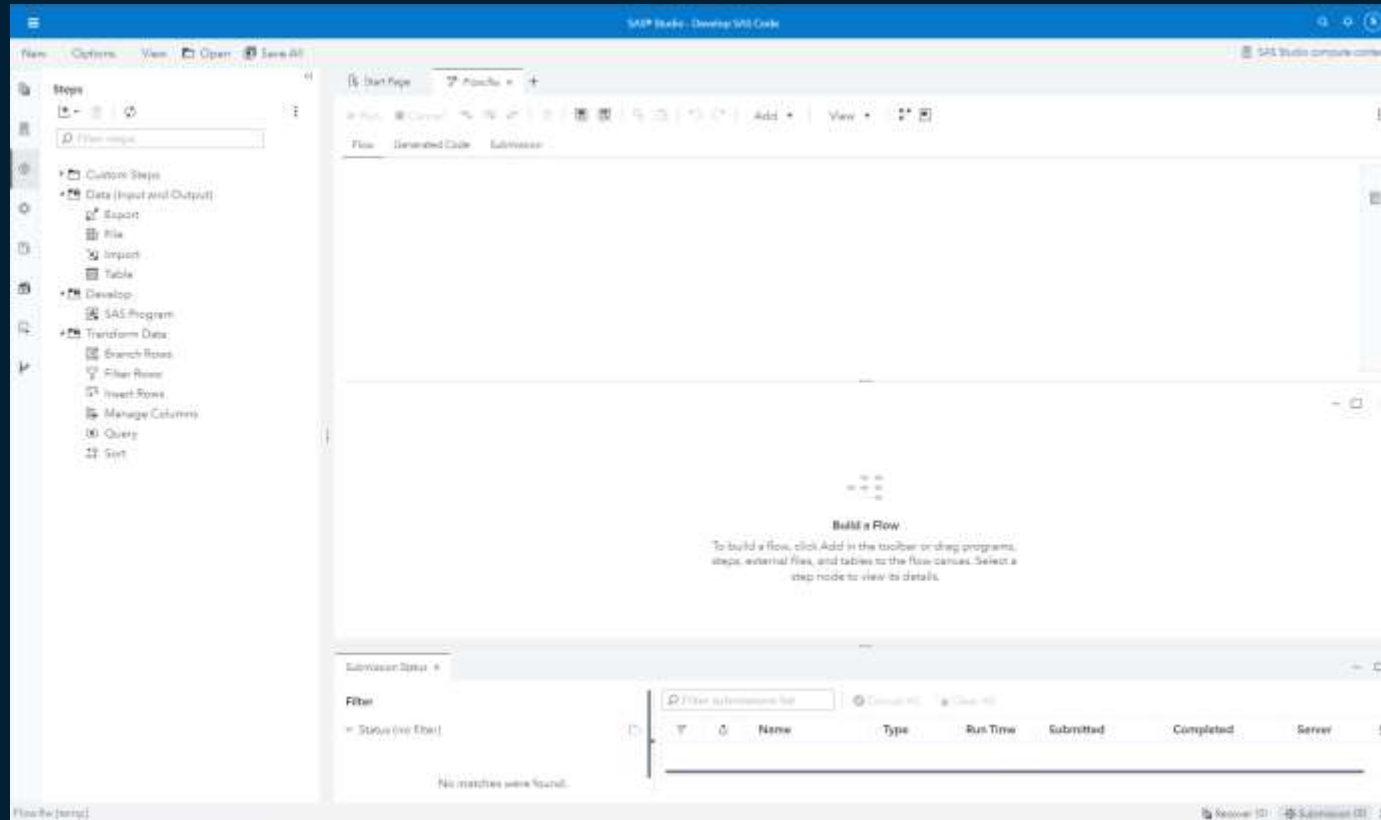
# SAS Studio

## Flow



# SAS Studio

## Flow



# SAS Studio

## Add items to Flow

The screenshot displays the SAS Studio interface with the 'Table' step selected in the flow. The left sidebar shows the 'Steps' panel with categories like Custom Steps, Data (Input and Output), Develop, and Transform Data. The main workspace shows the 'Table' step configuration, including fields for 'Library' (set to 'WORK'), 'Table name' (with a search icon), and 'Label'. Below these are tabs for 'Table Properties', 'Published Columns', 'Previous Data', and 'Nodes'. The 'Table Properties' tab is active, showing 'Columns' and 'Rows' sections. The 'Columns' section has a 'Filter' dropdown set to 'Status (no filter)'. The 'Rows' section shows a table with columns: Name, Type, Run Time, Submitted, Completed, and Server. The table is currently empty, with a message 'No matches were found.' at the bottom.

Table

Table Properties Published Columns Previous Data Nodes

Library \*  
Select a library

Table name \*  
Enter a table name

Label

Columns Rows

Submission Status \*

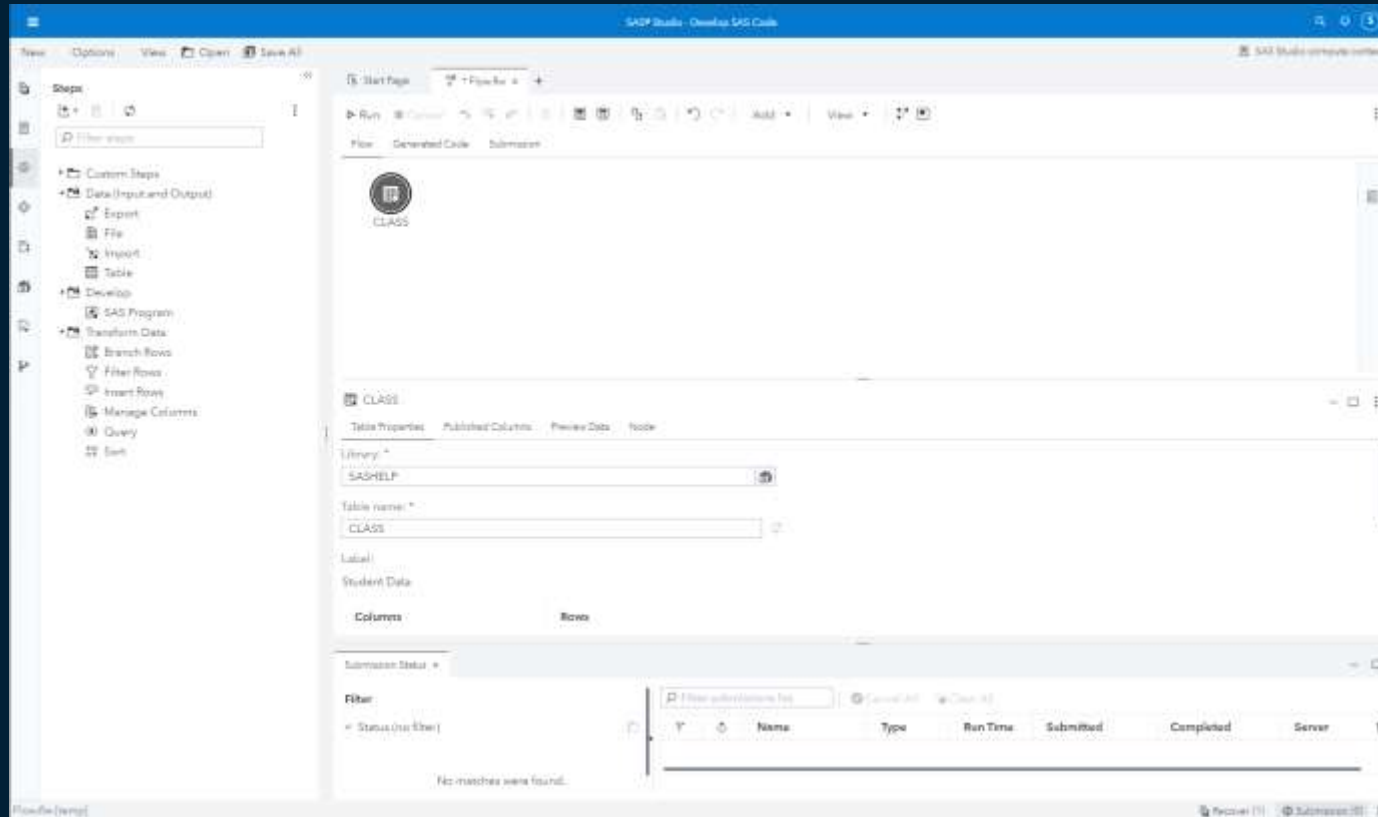
Filter  
▼ Status (no filter)

Name	Type	Run Time	Submitted	Completed	Server
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No matches were found.

# SAS Studio

## Tables





# SAS Studio

## Columns

The screenshot displays the SAS Studio interface. On the left is a 'Steps' pane with a search bar and a list of steps: Custom Steps, Data (Input and Output), Export, File, Import, Table, Develop, SAS Program, Transform Data, Branch Rows, Filter Rows, Insert Rows, Manage Columns, Query, and Sort. The 'Manage Columns' step is selected. The main workspace shows a 'Flow Run' view with a toolbar and a table structure. The table is named 'CLASSRT' and has the following columns:

#	Name	Label	Type	Length	Format	Inform
1	Name		Character	8		
2	Sex		Character	1		
3	Age		Numeric	8		
4	Height		Numeric	8		
5	Weight		Numeric	8		
6	predict	Predicted Value of Weight	Numeric	8		
7	lowermean	Lower Bound of 95% C.I. for Mean	Numeric	8		
8	uppermean	Upper Bound of 95% C.I. for Mean	Numeric	8		

At the bottom right of the interface, the status bar shows 'Resource (1)' and 'Submission (2)'.

# SAS Studio

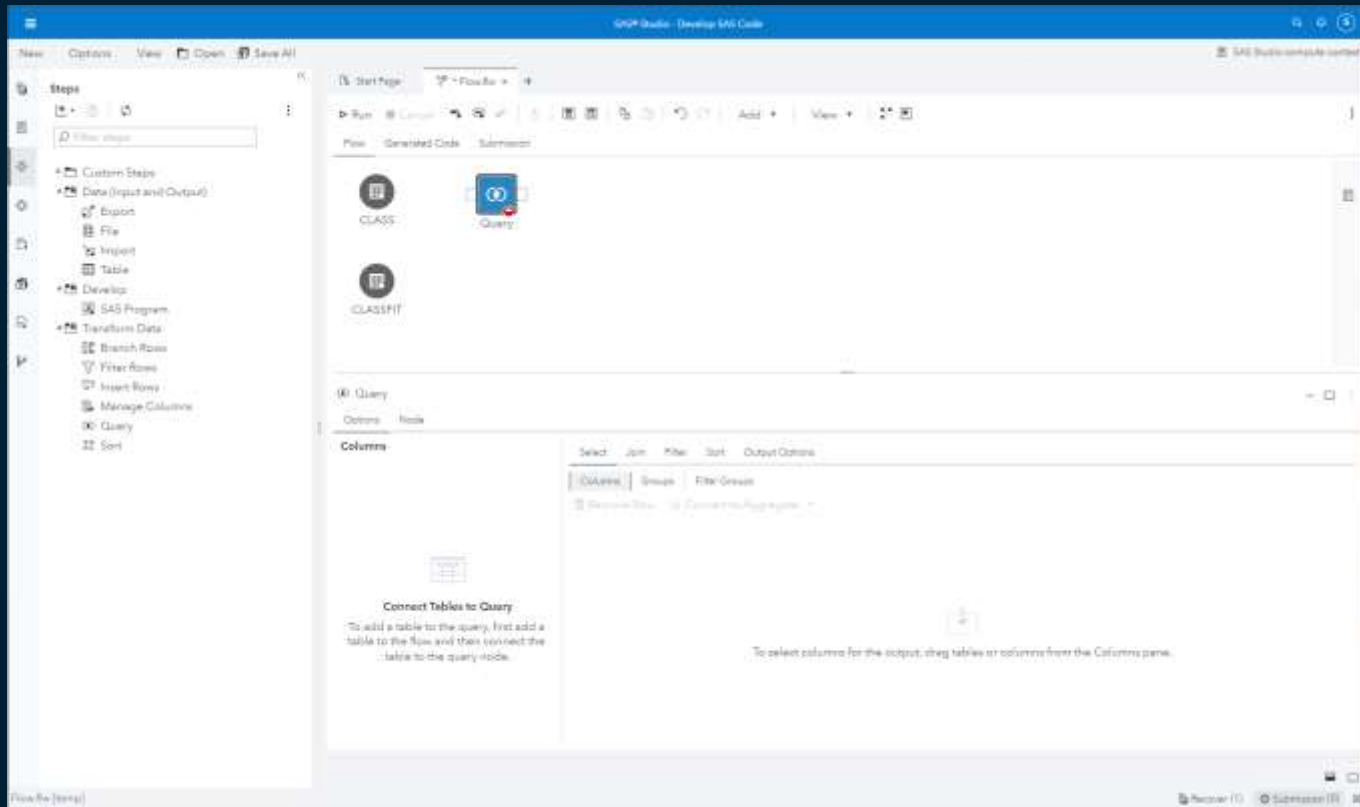
## Data view

The screenshot displays the SAS Studio interface in 'Data view' mode. The left sidebar shows a 'Steps' pane with a tree view of available actions, including 'Custom Steps', 'Data (Input and Output)', 'Export', 'File', 'Import', 'Table', 'Develop', 'SAS Program', 'Transform Data', 'Branch Rows', 'Filter Rows', 'Insert Rows', 'Manage Columns', 'Query', and 'Sort'. The main workspace shows the 'CLASSIT' dataset. Below the dataset name, there are tabs for 'Table Properties', 'Published Columns', 'Preview Data', and 'Node'. The 'Preview Data' tab is active, displaying a table with 19 rows and 10 columns. The columns are: Name, Sex, Age, Height, Weight, predict, lowermean, uppermean, lower, and upper. The data is sorted by the 'predict' column in descending order. The bottom status bar shows 'Worksheet (1)' and 'Submission (1)'.

	Name	Sex	Age	Height	Weight	predict	lowermean	uppermean	lower	upper
1	Joyce	F	11	51.3	53.5	56.943334...	43.904363464	70.182305335	29.883496...	84.103170...
2	Julius	F	12	56.3	77	70.486465...	67.940050237	93.010921149	51.314521...	101.66244...
3	Alice	F	13	56.5	84	77.286291...	68.956553333	85.638030161	52.150311...	102.38627...
4	James	M	12	57.3	83	80.387515...	72.687088548	88.107943376	55.475686...	105.29994...
5	Thomas	M	11	57.5	85	81.167322...	73.600043341	88.73460569	56.3025285	104.03711...
6	John	M	12	59	99.5	87.015867...	80.4782515	93.552483338	62.440135...	111.58661...
7	Jane	F	12	58.8	84.5	90.139991...	84.039505624	96.238677643	65.677977...	114.59220...
8	Janet	F	15	62.5	112.5	100.60247...	95.225785467	106.99916123	76.361201...	124.96374...
9	Jeffrey	M	13	62.5	84	100.60247...	95.225785467	106.99916123	76.361201...	124.96374...

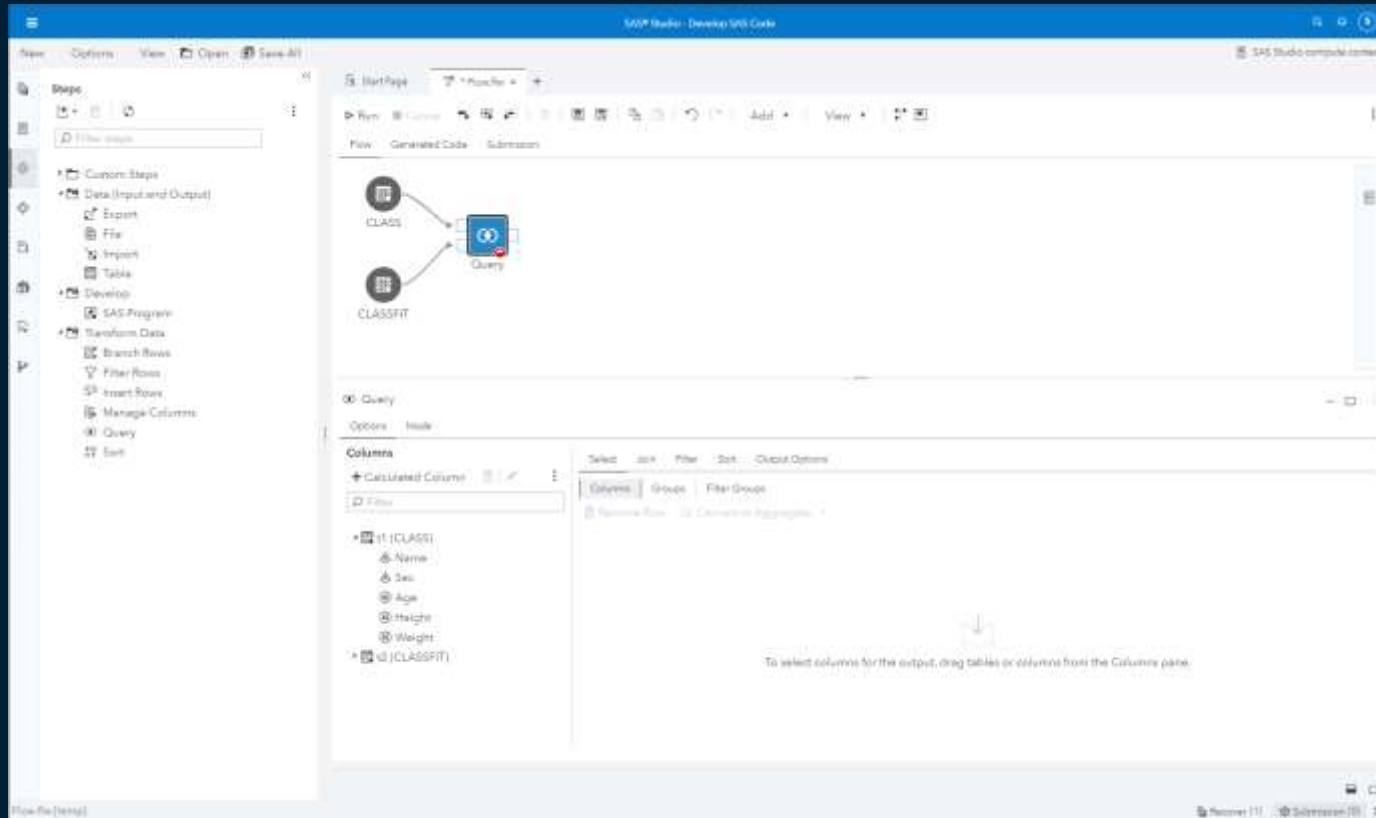
# SAS Studio

## Query



# SAS Studio

## Ports





# SAS Studio

## Output Table

The screenshot displays the SAS Studio interface. On the left, the 'Steps' pane lists various actions like 'Custom Step', 'Data (Input and Output)', 'Export', 'File', 'Import', 'Table', 'Develop', 'SAS Program', 'Transform Data', 'Branch Rows', 'Filter Rows', 'Insert Rows', 'Manage Columns', 'Query', and 'Sort'. The main workspace shows a workflow diagram with 'CLASS' and 'CLASSPT' steps feeding into a 'Query' step, which then outputs to 'ClassQ'. Below the diagram, the 'ClassQ' table properties are shown, including the library 'WORK' and table name 'ClassQ'. The bottom section of the properties pane shows 'Columns' and 'Rows' sections, with 'Date created: (not available)' and 'Date modified: (not available)' listed below.

**Steps:**

- Custom Step
- Data (Input and Output)
  - Export
  - File
  - Import
  - Table
- Develop
  - SAS Program
- Transform Data
  - Branch Rows
  - Filter Rows
  - Insert Rows
  - Manage Columns
  - Query
  - Sort

**Workflow Diagram:**

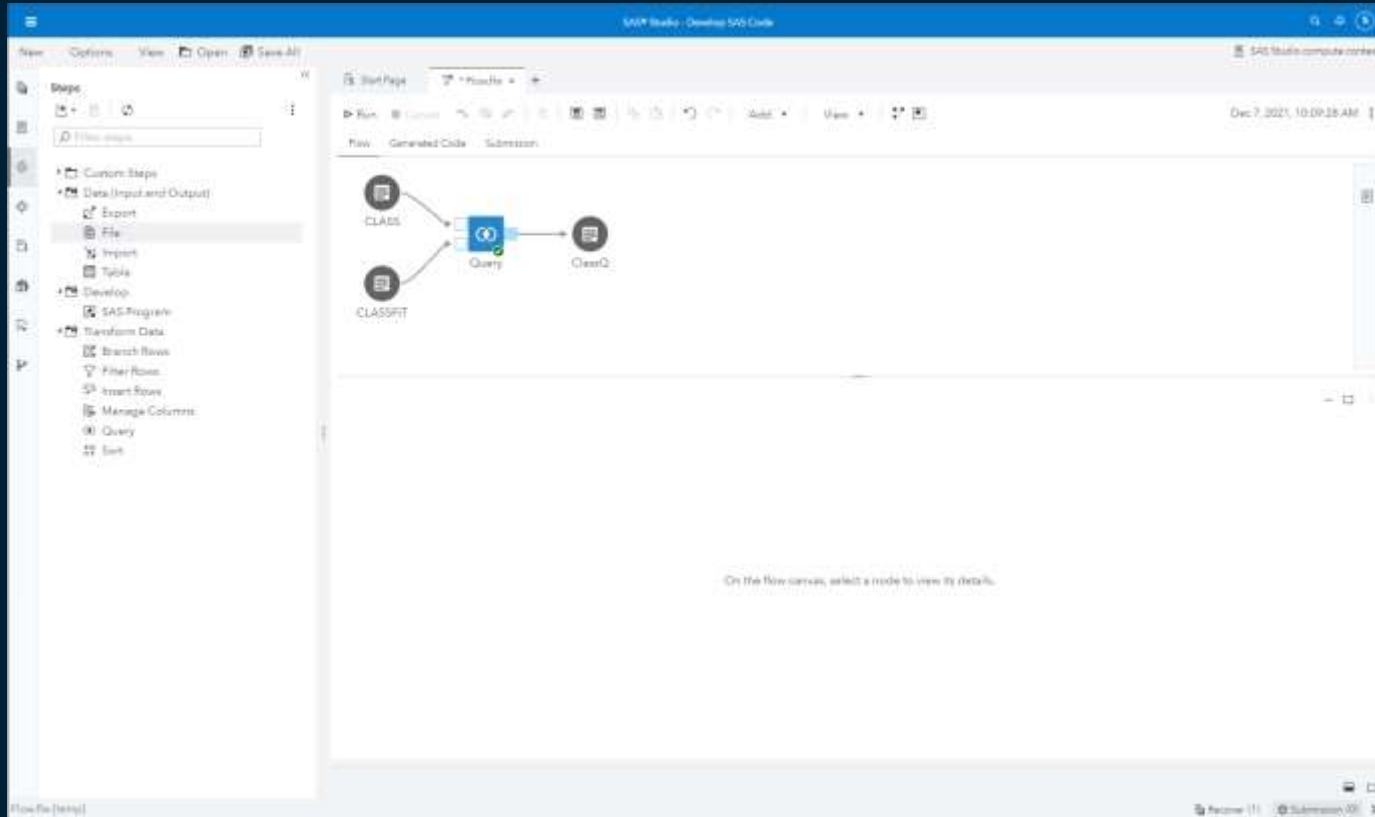
```
graph LR; CLASS --> Query; CLASSPT --> Query; Query --> ClassQ;
```

**ClassQ Table Properties:**

- Table Properties | Published Columns | Preview Data | Note
- Library: WORK
- Table name: ClassQ
- Label:
- Columns: (empty)
- Rows: (empty)
- Date created: (not available)
- Date modified: (not available)

# SAS Studio

## Run the node/flow



# SAS Studio

## Output

The screenshot displays the SAS Studio interface. On the left is a 'Steps' pane with a search bar and a list of tasks including 'Custom Steps', 'Data (Input and Output)', 'Develop', and 'Transform Data'. The main workspace shows a workflow diagram with three steps: 'CLASS', 'Query', and 'ClassQ'. The 'Query' step is selected, and its output is displayed in a table below. The table has columns for Name, Age, Height, Weight, Sex, and a predicted value. The data is as follows:

	Name	Age	Height	Weight	Sex	predict
11	Jayle	11	51.3	50.5	F	56.093334346
12	Audy	14	64.1	90	F	107.68072784
13	Louise	12	56.3	77	F	76.488485693
14	Mary	15	66.2	112	F	116.25859443
15	Philip	16	72	150	M	137.705260991
16	Robert	12	64.6	128	M	109.45024296
17	Ronald	15	67	133	M	118.20810957
18	Thomas	11	51.5	85	M	81.167322016
19	William	13	66.2	112	M	116.25859443



# SAS Studio

## Library/Table

The screenshot displays the SAS Studio interface. On the left, the 'Libraries' pane shows a tree structure with 'CLASSQ' selected under the 'WORK' library. The main workspace shows a workflow diagram with three nodes: 'CLASS', 'Query', and 'ClassQ'. The 'Query' node is highlighted. Below the diagram, the 'ClassQ' table is displayed with 19 rows and 6 columns. The table contains data for 19 individuals, including their Name, Age, Height, Weight, Sex, and a predicted value.

	Name	Age	Height	Weight	Sex	predict
11	Jayne	11	51.3	30.5	F	56.99334346
12	Judy	14	64.3	90	F	107.68072784
13	Louise	13	58.3	77	F	76.48548569
14	Mary	15	66.5	112	F	116.2585944
15	Pedro	16	72	150	M	137.70326091
16	Robert	12	64.6	128	M	106.63024268
17	Reinold	10	67	133	M	118.30810957
18	Thomas	11	57.5	85	M	81.167322016
19	William	15	66.5	112	M	116.2585944

# SAS Studio

## Filter Rows

The screenshot displays the SAS Studio web interface. On the left, the 'Steps' pane lists various data processing tasks, including 'Filter Rows' under the 'Transform Data' category. The main workspace shows a workflow diagram with four steps: 'CLASS', 'CLASSRT', 'Query', and 'Filter Rows'. The 'Filter Rows' step is selected, and its configuration pane is visible at the bottom. The configuration pane includes an 'Expression Builder' section with a dropdown menu set to 'Equal to'.

SAS Studio - Develop SAS Code

Steps

- Custom Steps
- Data (Input and Output)
  - Export
  - File
  - Import
  - Table
- Develop
  - SAS Program
- Transform Data
  - Branch Rows
  - Filter Rows
  - Insert Rows
  - Manage Columns
  - Query
  - Sort

Filter Rows

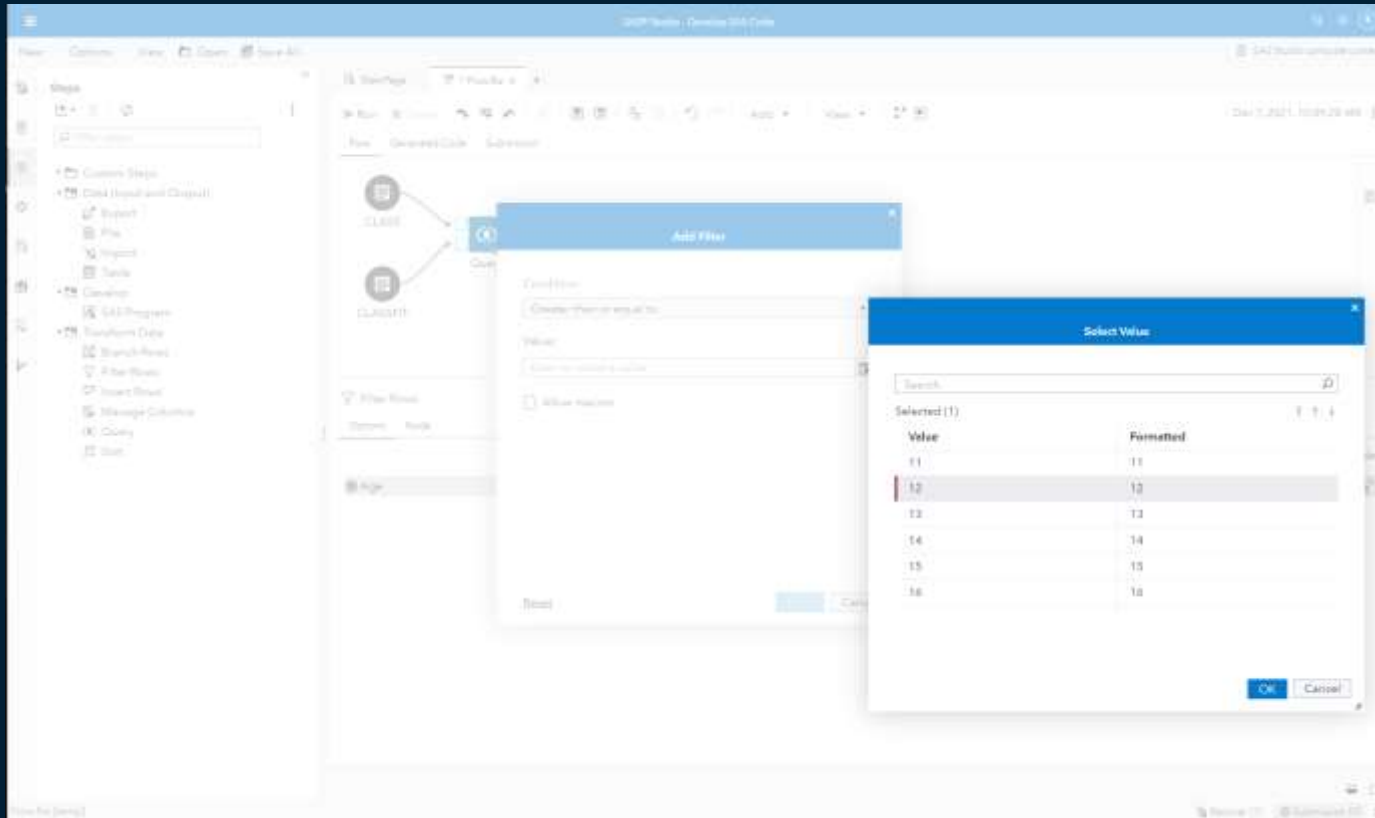
Options Node

Expression Builder

Equal to

# SAS Studio

## Point-and-click Interface



# SAS Studio

## Output

The screenshot displays the SAS Studio interface. On the left is the 'Steps' pane with a tree view containing categories like 'Custom Steps', 'Data (Input and Output)', 'Export', 'File', 'Import', 'Table', 'Develop', 'SAS Program', 'Transform Data', 'Branch Rows', 'Filter Rows', 'Insert Rows', 'Merge Columns', 'Query', and 'Sort'. The main workspace shows a workflow diagram with steps: 'CLASS', 'CLASSRT', 'Query', 'ClassQ', 'Filter Rows', and 'Filter'. The 'Filter Rows' step is selected, and its properties are shown in the bottom pane. The 'Table name' is set to 'Filter'. The 'Columns' and 'Rows' sections are empty. The 'Data created' and 'Data modified' status is 'not available'.

SAS Studio - Develop SAS Code

Start Page

Run Cancel View Add View

Row Generated Code Submission

CLASS CLASSRT Query ClassQ Filter Rows Filter

Filter

Table Properties Published Columns Preview Data Code

Library: \* work

Table name: \* Filter

Label:

Columns Rows

Date created: not available

Date modified: not available

File: Filter.sas

Resource 111 Submission 00

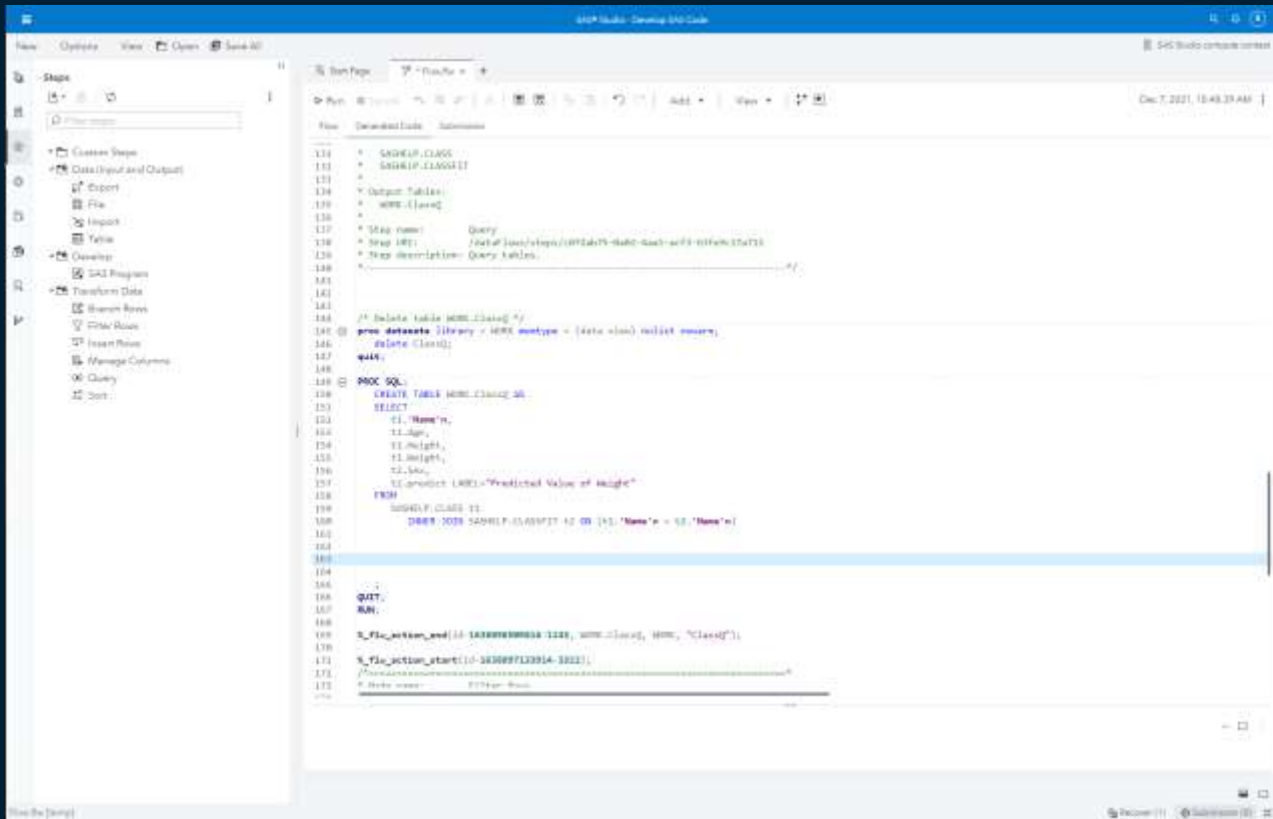
# SAS Studio

## Run Selectively

The screenshot displays the SAS Studio web interface. On the left is a 'Steps' sidebar with categories like 'Custom Steps', 'Data (Input and Output)', 'Develop', and 'Transform Data'. The main workspace shows a flow diagram with the following steps: 'CLAGE' and 'CLASSFIT' (input nodes) feed into a 'Query' step (blue icon with a magnifying glass). The 'Query' step feeds into 'ClassQ' (table icon), which feeds into 'Filter Rows' (blue icon with a funnel), which finally feeds into 'Filter' (table icon). Below the flow diagram, a message states: 'On the flow canvas, select a node to view its details.' The top of the interface includes a menu bar (New, Options, View, Open, Save All) and a toolbar with icons for running and managing the flow.

# SAS Studio

## Generated Code



The screenshot displays the SAS Studio interface. On the left is the 'Steps' pane with a tree view containing categories like 'Custom Steps', 'Data Input and Output', 'Export', 'File', 'Import', 'Table', 'Developer', 'SAS Programs', 'Transform Data', 'Shrink Rows', 'Filter Rows', 'Insert Rows', 'Manage Columns', 'Query', and 'Sort'. The main area is the 'Run Page' for a step named 'Query'. It shows a toolbar with icons for running, saving, and other actions, along with a timestamp 'Dec 7, 2021, 10:45:39 AM'. Below the toolbar is a table with columns 'View' and 'Generated Code'. The 'Generated Code' column contains the following SAS code:

```
114 * SASHELP.CLASS ;
115 * SASHELP.CLASS1 ;
116
117 * Output Table:
118 * WORK.CLASS1
119
120 * Step name: Query
121 * Step ID: /sas/steps/PP2sk7N-shd0-4ash-wF3-05F6h37u73
122 * Step description: Query tables.
123
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133 /* Delete table WORK.CLASS1 */
134
135 proc datasets library = WORK autotype = (data class) noiset noover;
136 delete CLASS1;
137 quit;
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The code includes a PROC DATASETS statement to delete the table WORK.CLASS1, followed by a PROC SQL statement to create a new table WORK.CLASS1 with columns for Name, Height, Weight, Age, and a calculated variable Predicted Value of Height. The table is populated with data from the SASHELP.CLASS dataset. The code concludes with a QUIT statement and a RUN statement.

# SAS Studio

## Output

The screenshot displays the SAS Studio interface with a workflow and its output. The workflow consists of the following steps:

- CLASS1
- CLASS2
- Query
- Class1
- Filter Rows
- Filter

The output is displayed in the 'Filter' step, showing a table with 11 rows and 6 columns. The columns are Name, Age, Height, Weight, Sex, and predict.

	Name	Age	Height	Weight	Sex	predict
1	Ahmed	18	89	112.0	M	126.00617011
2	Alice	13	56.3	94	F	27.368291747
3	Bartosz	13	65.3	99	F	111.57935811
4	Carl	14	62.8	102.2	F	101.82218244
5	Henry	14	63.3	102.5	M	104.58100363
6	James	10	57.3	83	M	80.307515463
7	Jane	12	59.8	84.5	F	90.130091834
8	Jeret	10	62.2	112.5	F	100.88247336
9	Jeffrey	12	62.3	84	M	100.65247336
10	John	12	59	84.3	M	87.915863419
11	Julia	16	66.3	90	F	107.680751784

# SAS Studio

## Output table viewer

The screenshot displays the SAS Studio interface with the Output table viewer open. The left sidebar shows the 'Steps' pane with a tree view containing 'Custom Steps', 'Data Input and Output', 'Export', 'File', 'Import', 'Table', 'Developer', 'SAS Program', 'Transform Data', 'Search Rows', 'Filter Rows', 'Insert Rows', 'Manage Columns', 'Query', and 'Sort'. The main workspace shows a 'Test Page' with a 'Filter' step selected. The 'Filter' step is configured with 'CLASS' and 'FILTER' library names. The 'Output Data' tab is active, displaying a table with 17 rows and 6 columns: Name, Age, Height, Weight, Sex, and product. The table is filtered to show only rows where the 'product' column is not null. The table data is as follows:

	Name	Age	Height	Weight	Sex	product
1	Albert	14	69	112.5	M	126.09617011
2	Alise	13	56.5	84	F	77.268291747
3	Bethany	13	65.3	98	F	111.57970811
4	Carol	14	62.8	102.5	F	101.83218244
5	Henry	14	63.5	102.5	M	104.54190363
6	James	12	57.3	81	M	80.38715562
7	Jane	12	56.8	84.5	F	45.110991434
8	Janet	15	62.8	112.5	F	100.44247136
9	Jeffrey	13	62.5	84	M	109.46247336
10	John	12	59	95.5	M	87.015967419
11	Kyle	14	64.5	91	F	107.68071704

The bottom of the screen shows the 'Filter' step configuration, including 'Table Properties', 'Published Columns', 'Filtering Data', and 'Tools'.



# SAS Studio

## Branch Rows

The screenshot displays the SAS Studio interface. On the left is the 'Shops' pane with a search bar and a list of tasks including 'Custom Steps', 'Data (Input and Output)', 'Export', 'File', 'Import', 'Table', 'Developing', 'SAS Program', 'Transform Data', 'Branch Rows', 'Filter Rows', 'Insert Rows', 'Manage Columns', 'Query', and 'Sort'. The main workspace shows a workflow diagram with the following steps: 'CSASS' and 'CLASSPT' (input) feeding into a 'Query' step, followed by 'ClassQ', 'Filter Rows', 'Filter', and finally 'Branch Rows'. Below the diagram, the 'Branch Rows' configuration panel is open, showing 'Options' and 'New' tabs. The 'Condition' section has two rows for defining output tables. The first row is for 'Output table 1' and the second for 'Output table 2'. Each row includes a 'Show to output point' checkbox, a text input field, a dropdown menu set to 'Equal to', and an 'Expression Builder' button.

# SAS Studio

## Output

The screenshot displays the SAS Studio web interface. On the left, the 'Steps' pane lists various data processing tasks such as 'Custom Steps', 'Data Input and Output', 'Export', 'File', 'Import', 'Table', 'Compute', 'SQL Program', 'Transform Data', 'Branch Point', 'Filter Rows', 'Insert Rows', 'Manage Columns', 'Query', and 'Sort'. The main workspace shows a data flow diagram with the following steps: 'CLAGE' and 'CLASMT' (input tables) feed into a 'Query' step, which connects to 'ClassG', then 'Other Rows', then 'Filter', and finally 'Branch Point'. The 'Branch Point' step outputs to 'Branch1' and 'Branch2' (output tables). Below the diagram, the 'Branch Point' configuration panel is visible, showing 'Options' and 'Code' tabs. Under the 'Code' tab, there are two 'Stream to output port' sections, each with a dropdown menu set to 'Equal to' and an 'Expression Builder' button.

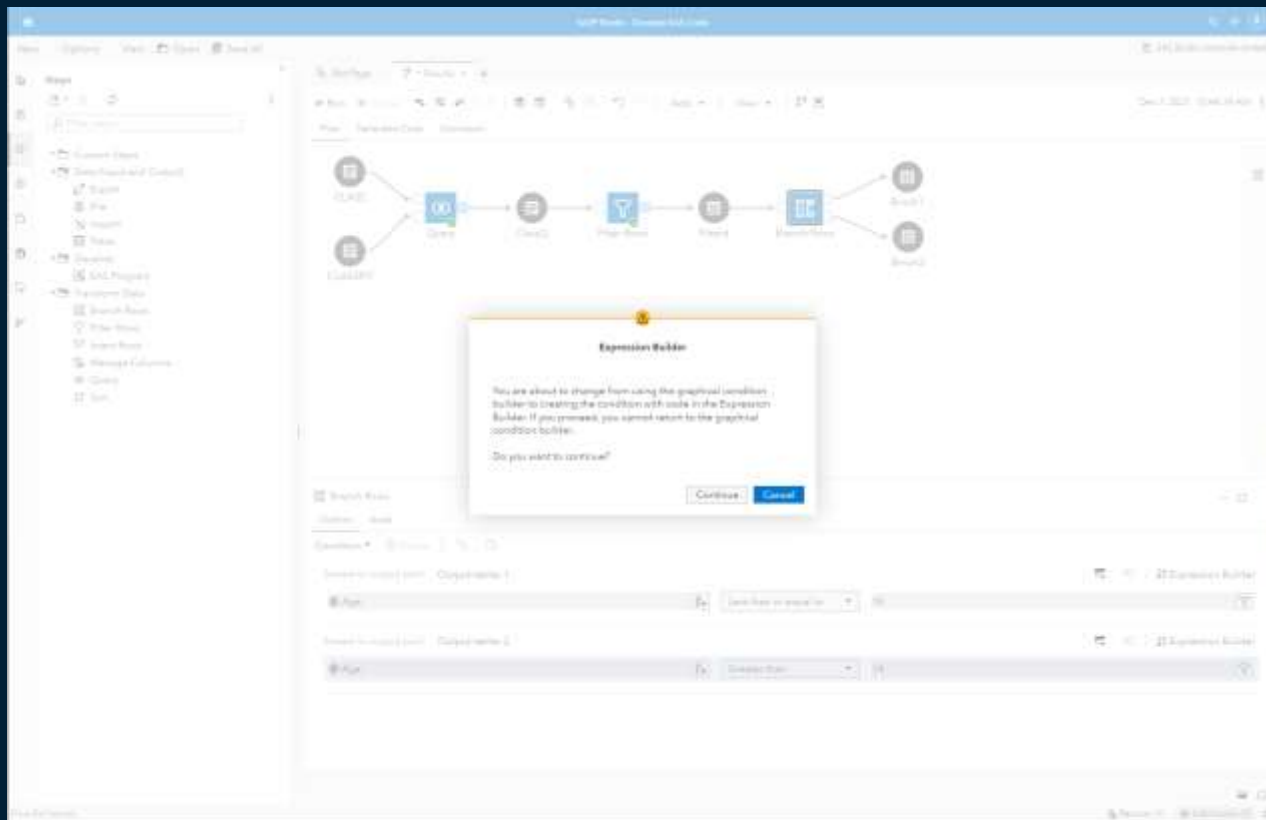
# SAS Studio

## Criteria

The screenshot displays the SAS Studio interface. On the left is a 'Steps' pane with a tree view containing categories like 'Custom Steps', 'Data (Input and Output)', 'Describing', 'Transform Data', and 'Visualize'. The main workspace shows a data flow diagram with the following steps: 'CLASS' and 'CLASSPT' feeding into a 'Query' step, which leads to 'Class2', then 'Filter Rows', then 'Filter', and finally a 'Branch Row' step. The 'Branch Row' step has two output paths labeled 'Branch1' and 'Branch2'. Below the diagram, the 'Branch Row' step is selected, and its configuration pane is visible. It shows two conditions for branching based on the 'Age' variable. The first condition is 'Less than or equal to 18', leading to 'Output table 1'. The second condition is 'Greater than 18', leading to 'Output table 2'. Each condition has an 'Expression Builder' icon to its right. The top of the window shows the 'SAS Studio: Tweety SAS Code' title bar and a menu bar with 'File', 'Options', 'View', 'Open', and 'Save All'. The bottom status bar indicates 'Project (1)' and 'Submission (1)'.

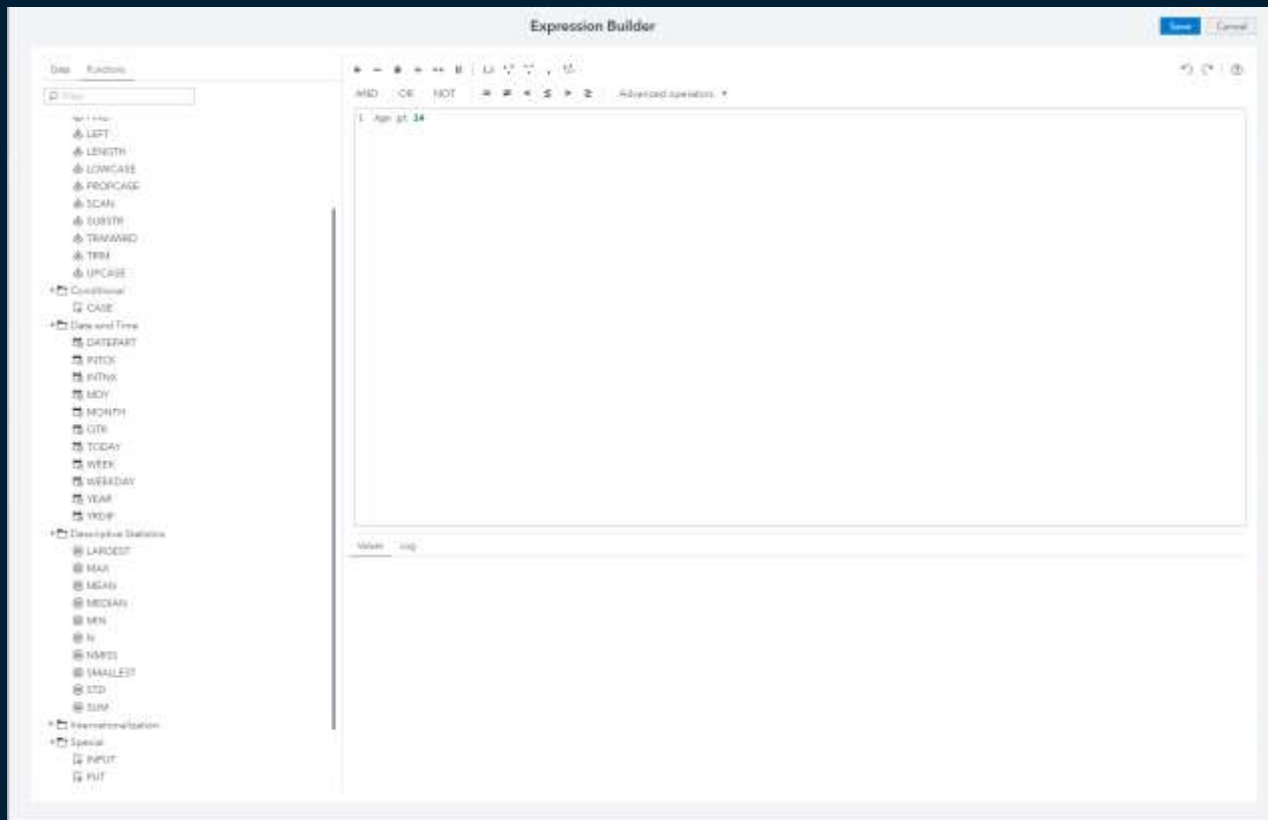
# SAS Studio

## Visual or via Expression Builder



# SAS Studio

## Expression Builder



# SAS Studio

## Criteria

The screenshot displays the SAS Studio interface. On the left, the 'Steps' pane lists various data processing tasks. The main workspace shows a workflow diagram with the following steps: CLASS, CLASSPT, Query, ClassQ, Filter Rows, Repeat, Branch Rows, Result1, and Result2. The 'Branch Rows' step is selected, and its configuration pane is visible at the bottom. This pane includes a 'Condition' section with a dropdown set to 'Table' and a 'Filter' section with a dropdown set to 'Less than or equal to'. The filter is applied to the 'Age' variable, with a value of '14' entered. The 'Repeat' section is also visible, showing a dropdown set to 'Repeat' and a value of '14'.

Steps

- Custom Steps
- Data (Input and Output)
- Export
- File
- Import
- Table
- Clustering
- SAS Program
- Transform Data
- Branch Rows
- Filter Rows
- Insert Rows
- Manage Columns
- Query
- Sort

Workflow Diagram:

```
graph LR; CLASS --> CLASSPT; CLASSPT --> Query; Query --> ClassQ; ClassQ --> Filter Rows; Filter Rows --> Repeat; Repeat --> Branch Rows; Branch Rows --> Result1; Branch Rows --> Result2;
```

Branch Rows Configuration:

Condition: Table

Filter: Less than or equal to

Filter Variable: Age

Filter Value: 14

Repeat: Repeat

Repeat Value: 14

# SAS Studio

## Library listing

The screenshot displays the SAS Studio web interface. On the left, the 'Libraries' pane shows a tree view of available libraries, including MAPS, MAPSDR, MAPSSE, SASHELP, SASUSER, WORK, BRANCH1, BRANCH2, CLASSQ, and FILTERD. The 'CLASSQ' library is currently selected. The main workspace shows a workflow diagram with the following steps: 'CLASS' and 'CLASSPT' data sources feed into a 'Query' node. The output of the 'Query' node feeds into a 'ClassQ' node, which then feeds into a 'Class-Based' node. The output of the 'Class-Based' node feeds into a 'Class' node, which finally feeds into a 'Branch-Based' node. The 'Branch-Based' node has two output destinations, 'Branch1' and 'Branch2'. The interface includes a top menu bar with options like 'File', 'Options', 'View', 'Open', and 'Save As'. A toolbar with various icons for workflow management is located below the menu bar. The bottom status bar shows the current session and submission status.

# SAS Studio

## Side note

- If you leave let your Studio session sit to long, it may reset
- If you forgot to save a flow (like it did!) be sure to check the Recover toggle on the lower right of the Studio interface – next to the Submission status
- In most cases your non-saved work will appear there.
- Select Recover, Apply and Close and your work should reappear!



# SAS Studio

## Insert Rows

The screenshot displays the SAS Studio interface. On the left, the 'Steps' pane shows a list of tasks including 'Custom Steps', 'Data (Input and Output)', 'Export', 'File', 'Import', 'Table', 'Develop', 'SAS Program', 'Transform Data', 'Branch Rows', 'Filter Rows', 'Insert Rows', 'Manage Columns', 'Query', and 'Sort'. The 'Insert Rows' task is highlighted. The main workspace shows a workflow diagram with the following steps: 'CLASS', 'CLASSIT', 'Query', 'Class2', 'Filter Rows', 'Filter2', 'Branch Rows', 'Branch1', and 'Branch2'. The 'Insert Rows' task is selected, and its configuration pane is visible on the right. The configuration pane has tabs for 'Options', 'Column Resolution', and 'Tools'. The 'Options' tab is active, showing the following settings:

- Source: (not available)
- Target: (not available)
- ☒ If physical table does not exist, create a table
- ☐ Delete all rows

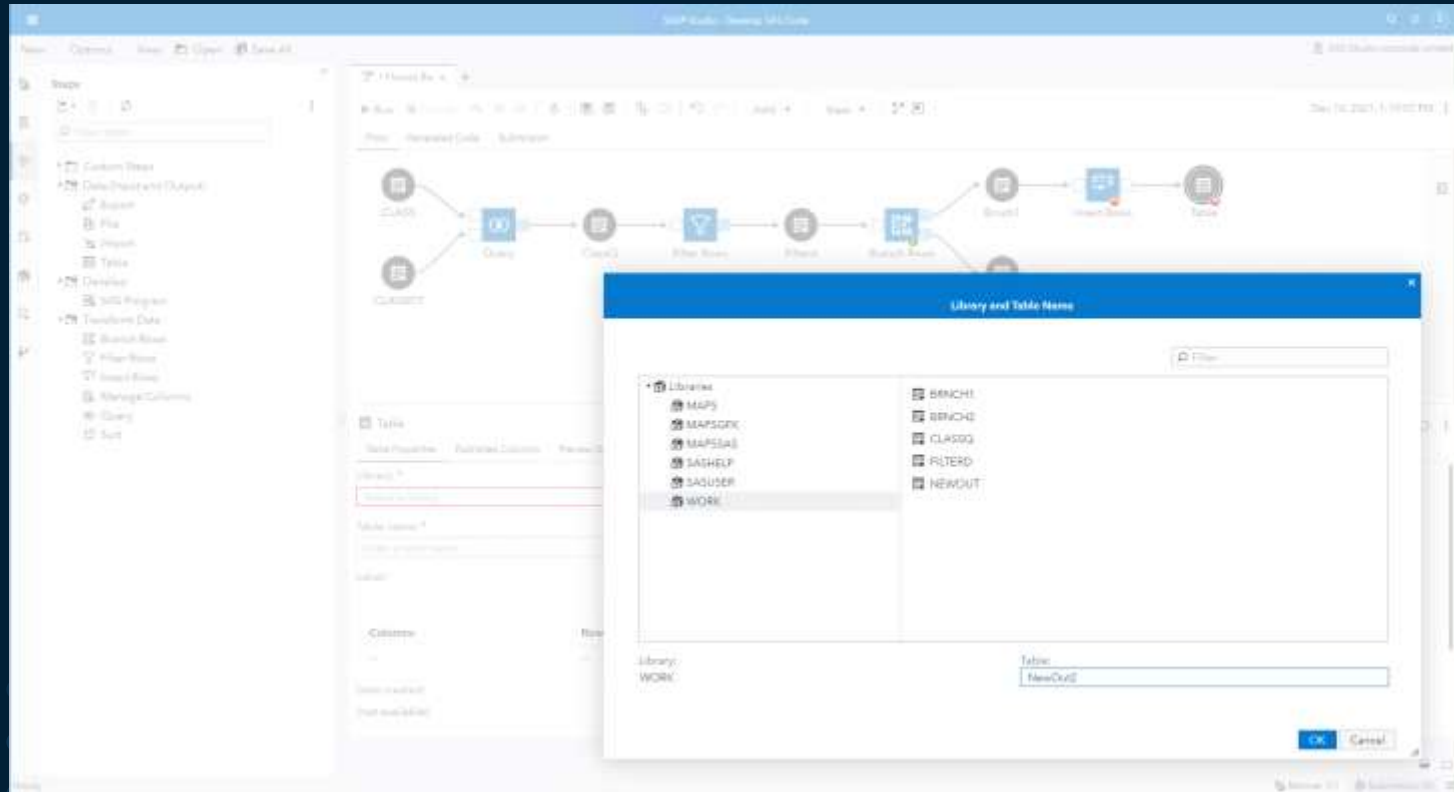
# SAS Studio

## Options

The screenshot displays the SAS Studio web interface. On the left is a 'Steps' sidebar with categories like 'Custom Steps', 'Data (Input and Output)', 'File', 'Import', 'Table', 'Developer', 'SAS Program', 'Transform Data', 'Branch Rows', 'Filter Rows', 'Insert Rows', 'Manage Columns', 'Query', and 'Sort'. The main workspace shows a data flow diagram with steps: 'CLASS', 'CLASSPT', 'Query', 'ClassQ', 'Filter Rows', 'Filter', 'Branch Rows', 'Branch1', 'Branch2', and 'Insert Rows'. Below the diagram, the 'Insert Rows' step is selected, showing its configuration panel. The panel has tabs for 'Options', 'Column Resolution', and 'Code'. Under the 'Options' tab, the 'Source' is set to 'Branch1' and the 'Target' is '(not available)'. There are two checkboxes: 'If physical table does not exist, create a table' (which is checked) and 'Delete all rows' (which is unchecked). The top of the interface includes a menu bar with 'New', 'Options', 'View', 'Open', and 'Save All', and a status bar at the bottom showing 'Ready' and 'Recover (1)'.

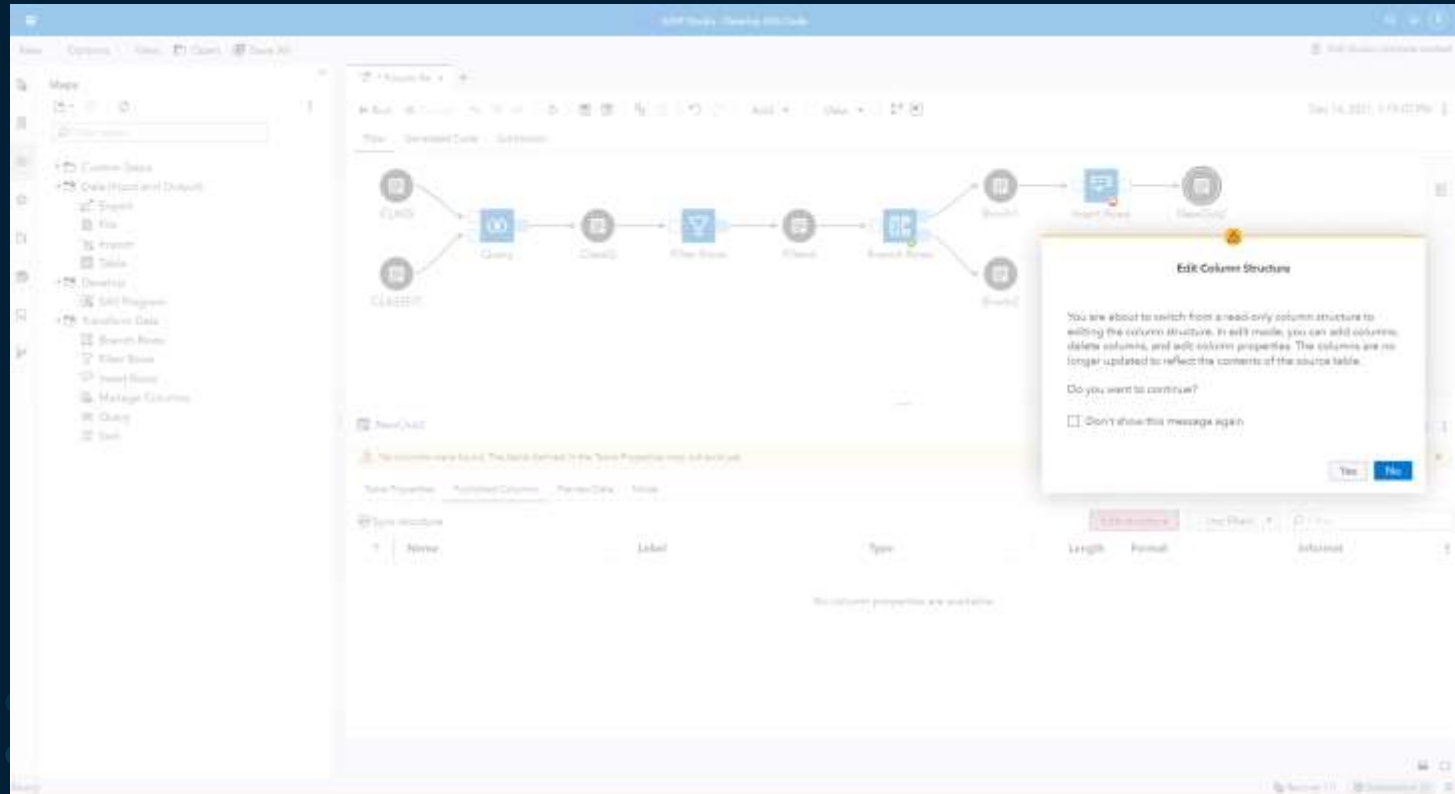
# SAS Studio

## Output



# SAS Studio

## Edit



# SAS Studio

## Edited

The screenshot displays the SAS Studio interface with a workflow diagram and a table definition panel.

**Workflow Diagram:**

- Inputs: CLASS, CLASSRT
- Steps: Query, ClassQ, Filter Rows, Filter, Branch Rows, Branch1, Branch2, Insert Rows, NewOut2

**Table Definition Panel (NewOut2):**

No options were found. The table defined in the Table Properties may not exist yet.

Name	Label	Type	Length	Format	Informal
1 Name	Name	Character	8		
2 Predict	Predicted Value	Numeric	8		

# SAS Studio

## Resolution

The screenshot displays the SAS Studio interface. On the left is a 'Steps' pane with categories like Custom Steps, Data (Input and Output), and Transform Data. The main workspace shows a workflow diagram with steps: CLASS, CLASSFIT, Query, ClassQ, Filter Rows, Filter1, Branch Rows, Branch1, Branch2, Insert Rows, and NewOut2. Below the workflow, the 'Insert Rows' step is configured. It shows a table mapping columns from 'Branch1' to 'NewOut2'.

Branch1	Mapping	NewOut2
Name		Name
Age		
Height		
Weight		
Sex		
predict		Predict

# SAS Studio

## Output

The screenshot displays the SAS Studio interface with a workflow diagram and a data table output.

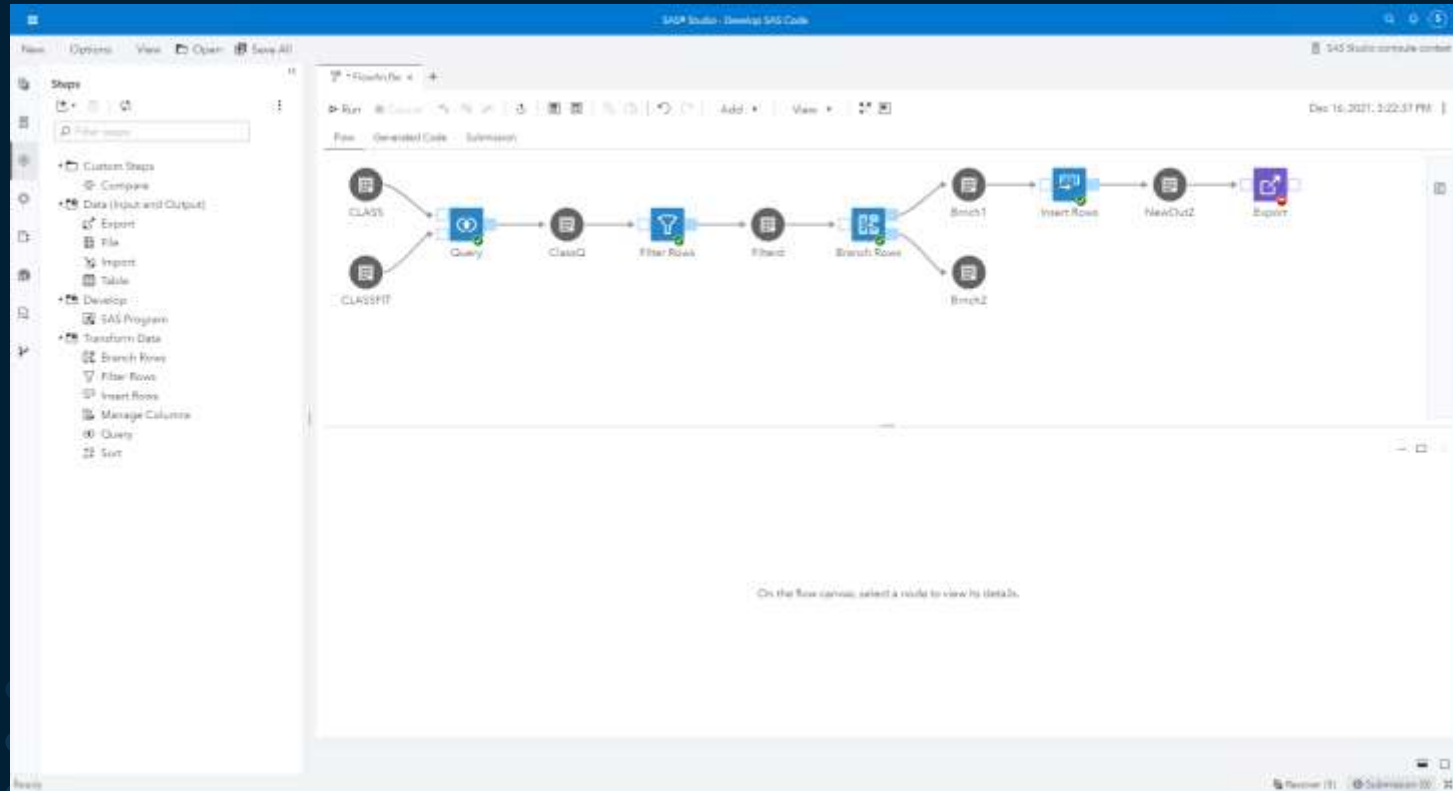
**Workflow Diagram:** The diagram shows a sequence of steps: CLASS and CLASSRT inputs feed into a Query step. The output of the Query step feeds into a ClassQ step. The output of ClassQ feeds into a Filter Rows step. The output of Filter Rows feeds into a Filtered step. The output of Filtered feeds into a Branch Rows step. The output of Branch Rows feeds into Branch1 and Branch2 steps. The output of Branch1 feeds into an Insert Table step. The output of Insert Table feeds into NewOut2.

**Data Table Output:** The table is titled "NewOut2" and has 2 columns: "Name" and "Predict". The data is as follows:

	Name	Predict
1	Alfred	126.00617011
2	Alice	77.296291747
3	Barbara	111.57975811
4	Cecil	101.83218244
5	Henry	104.56100363
6	James	90.387510962
7	Jane	90.133091634
8	Jeffrey	100.66247336

# SAS Studio

## Export





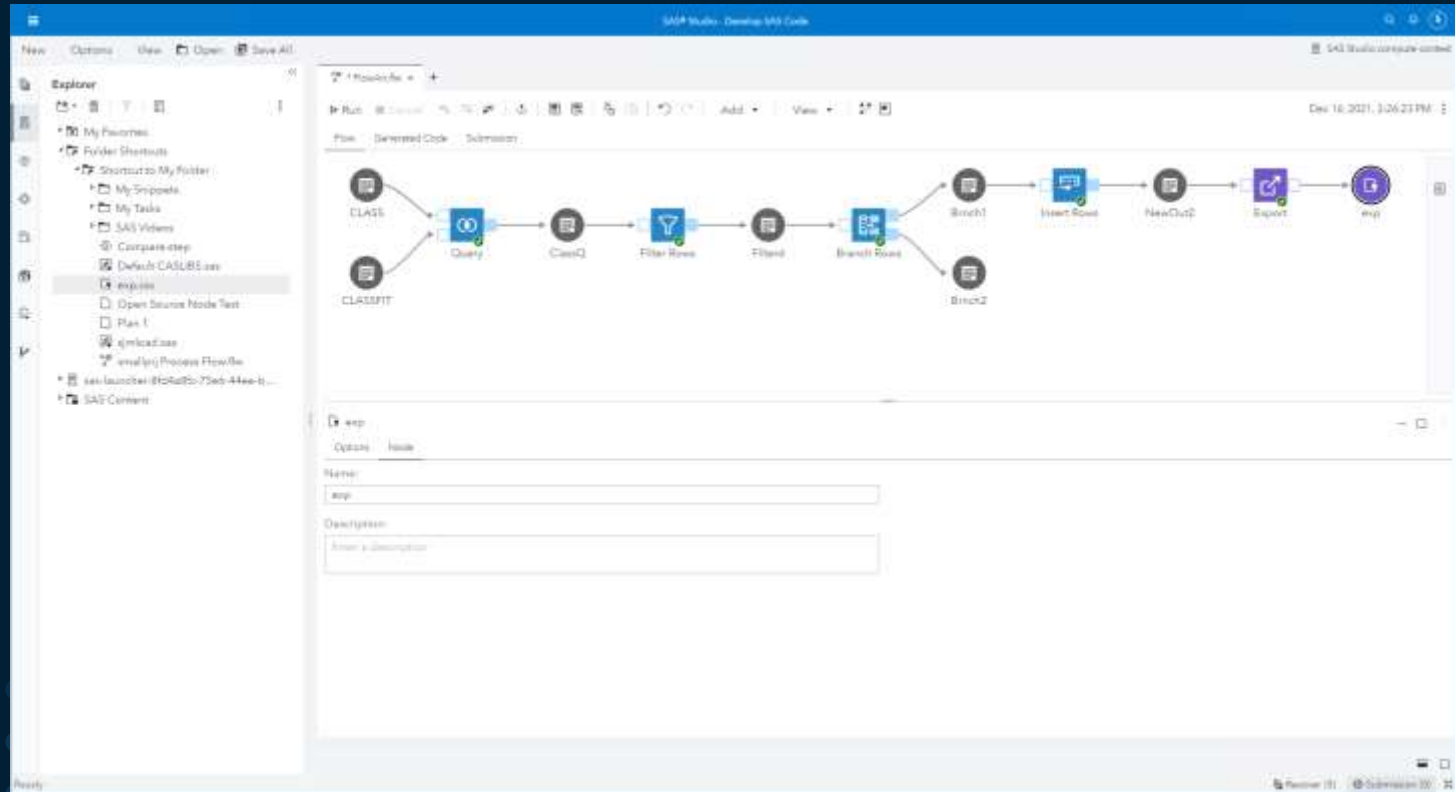
# SAS Studio

## Output

The screenshot displays the SAS Studio interface. On the left is a 'Steps' pane with a tree view containing categories like 'Custom Steps', 'Data (Input and Output)', 'File', 'Import', 'Table', 'Develop', 'SAS Program', 'Transform Data', 'Branch Rows', 'Filter Rows', 'Insert Rows', 'Manage Columns', 'Query', and 'Sort'. The main workspace shows a workflow diagram with nodes: 'CLASS', 'CLASSRT', 'Query', 'ClassQ', 'Filter Rows', 'Filter', 'Branch Rows', 'Branch1', 'Branch2', 'Insert Rows', 'NewOut2', 'Export', and 'exp'. Below the workflow, the 'exp' node is selected, and its properties are shown in a panel. The 'Data' section of the panel includes: 'File location' set to '/Users/bsiemens/My Folder/exp.csv', 'File name' set to 'exp.csv', 'File type' set to 'Comma delimited (.csv)', a checked checkbox for 'Column names are in first row of file', and 'Delimiter' set to 'Comma'.

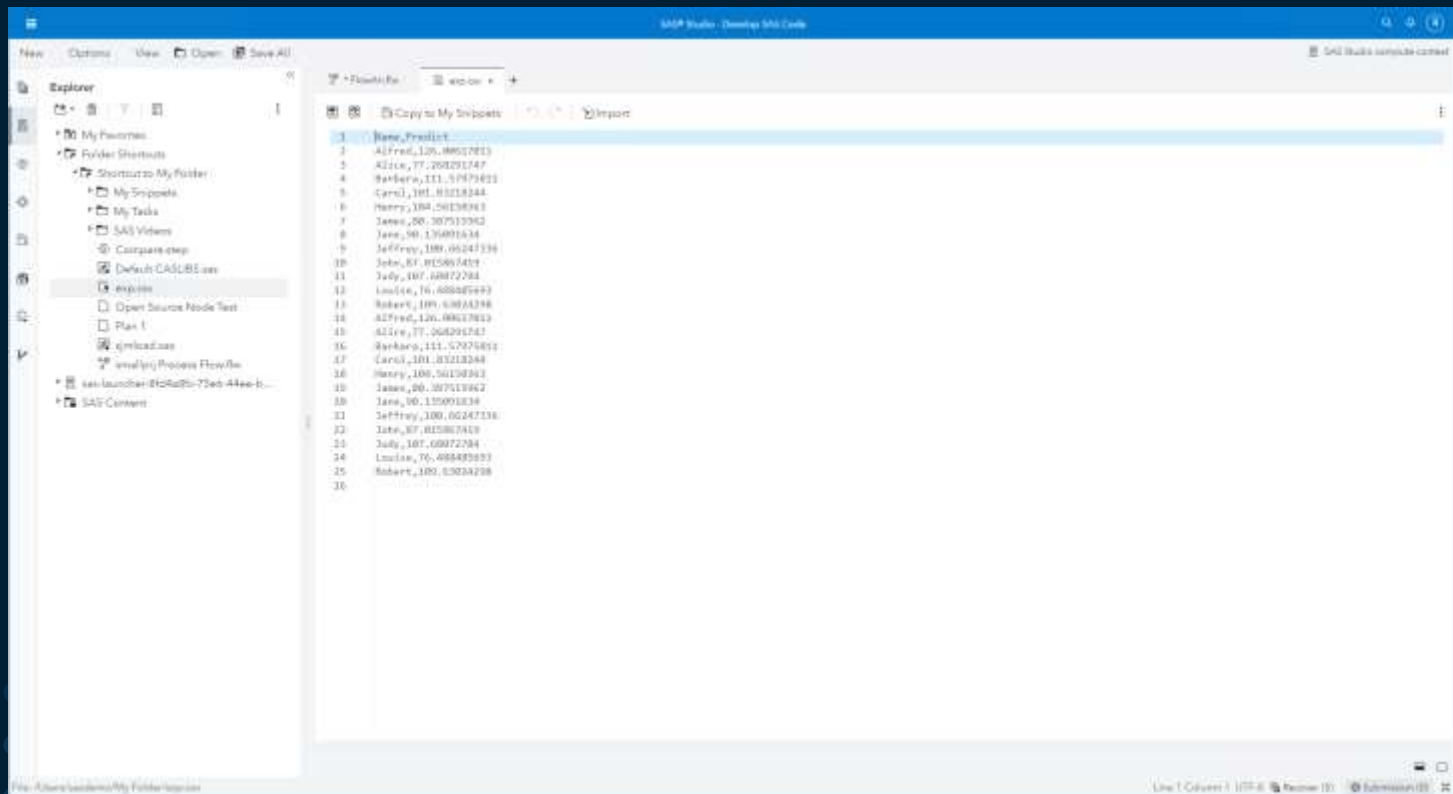
# SAS Studio

## File



# SAS Studio

## CSV



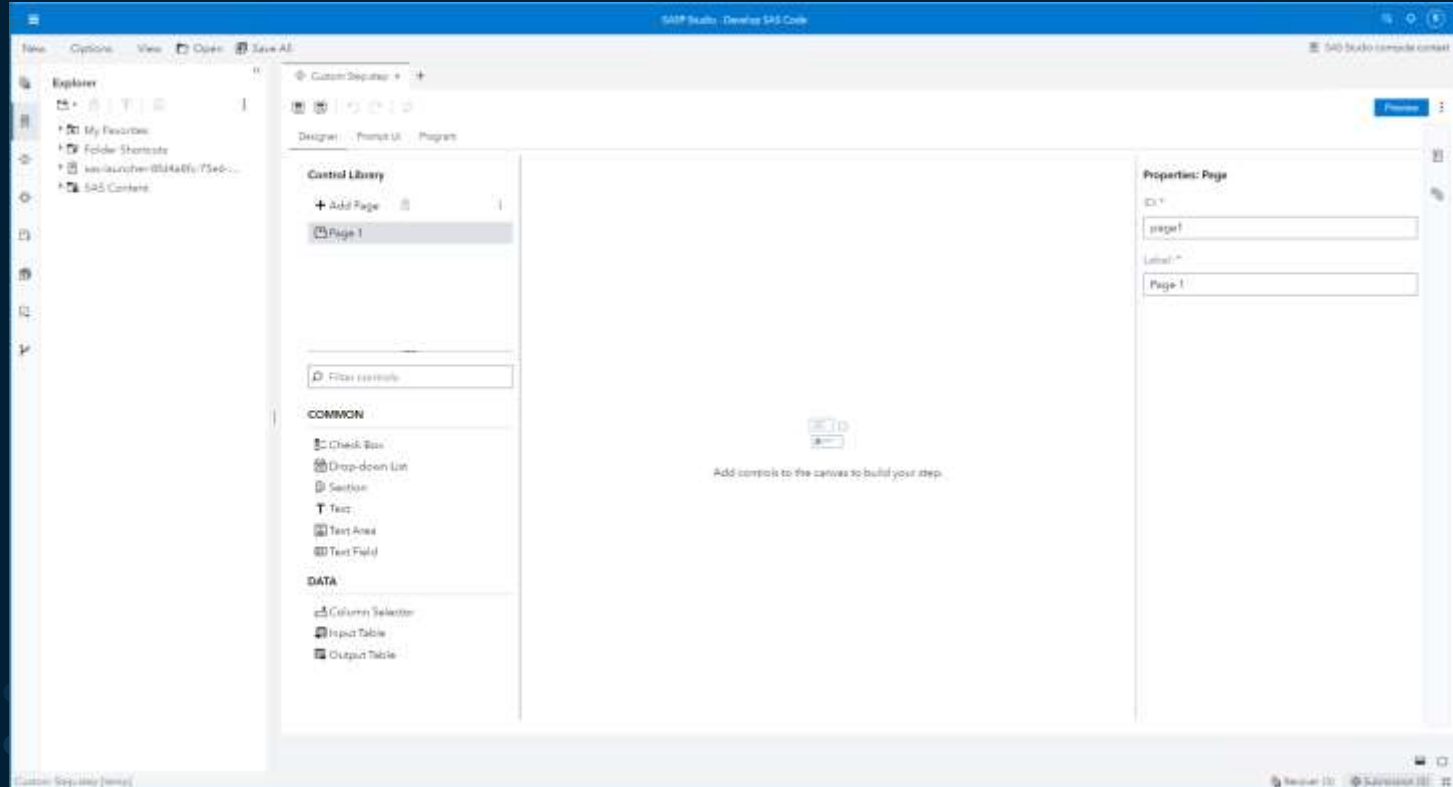
# SAS Studio

## Custom Steps

- Part of Studio Analyst
- Can create your own Steps via Drag-and-drop interface
- Three-part process
  - Designer
  - Prompt UI
  - Program
- More Custom Steps available on GitHub

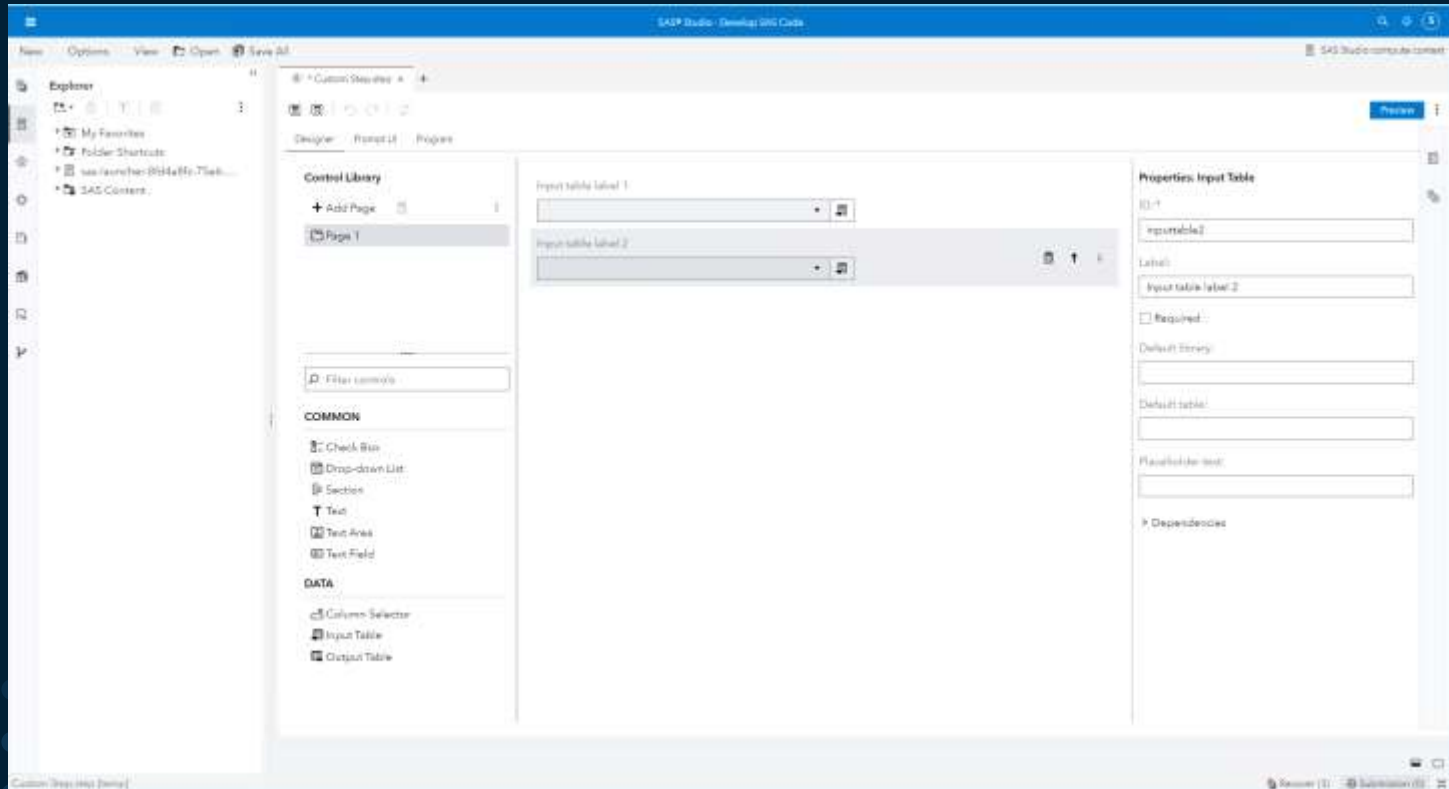
# SAS Studio

## Interface



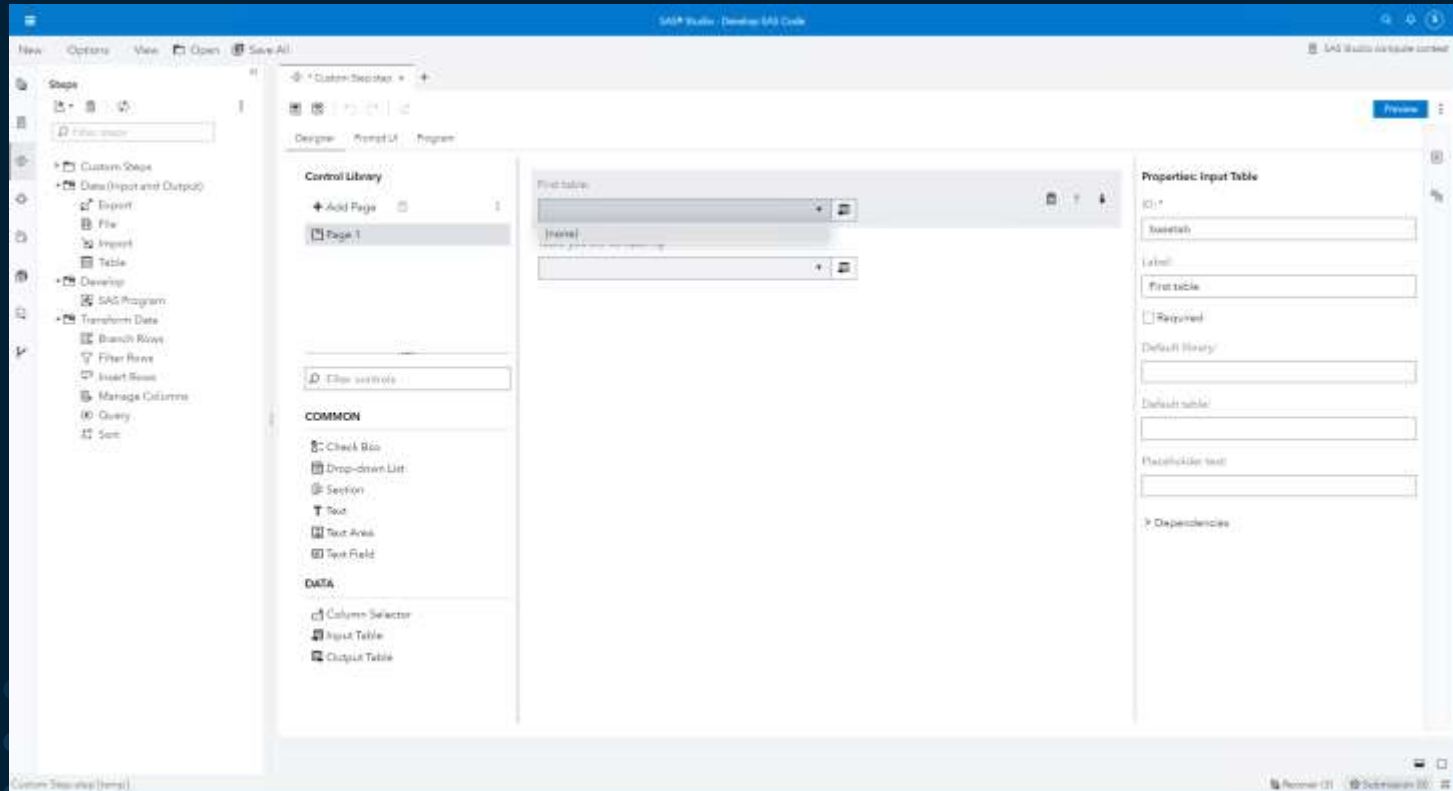
# SAS Studio

## Compare



# SAS Studio

## Variables & Labels

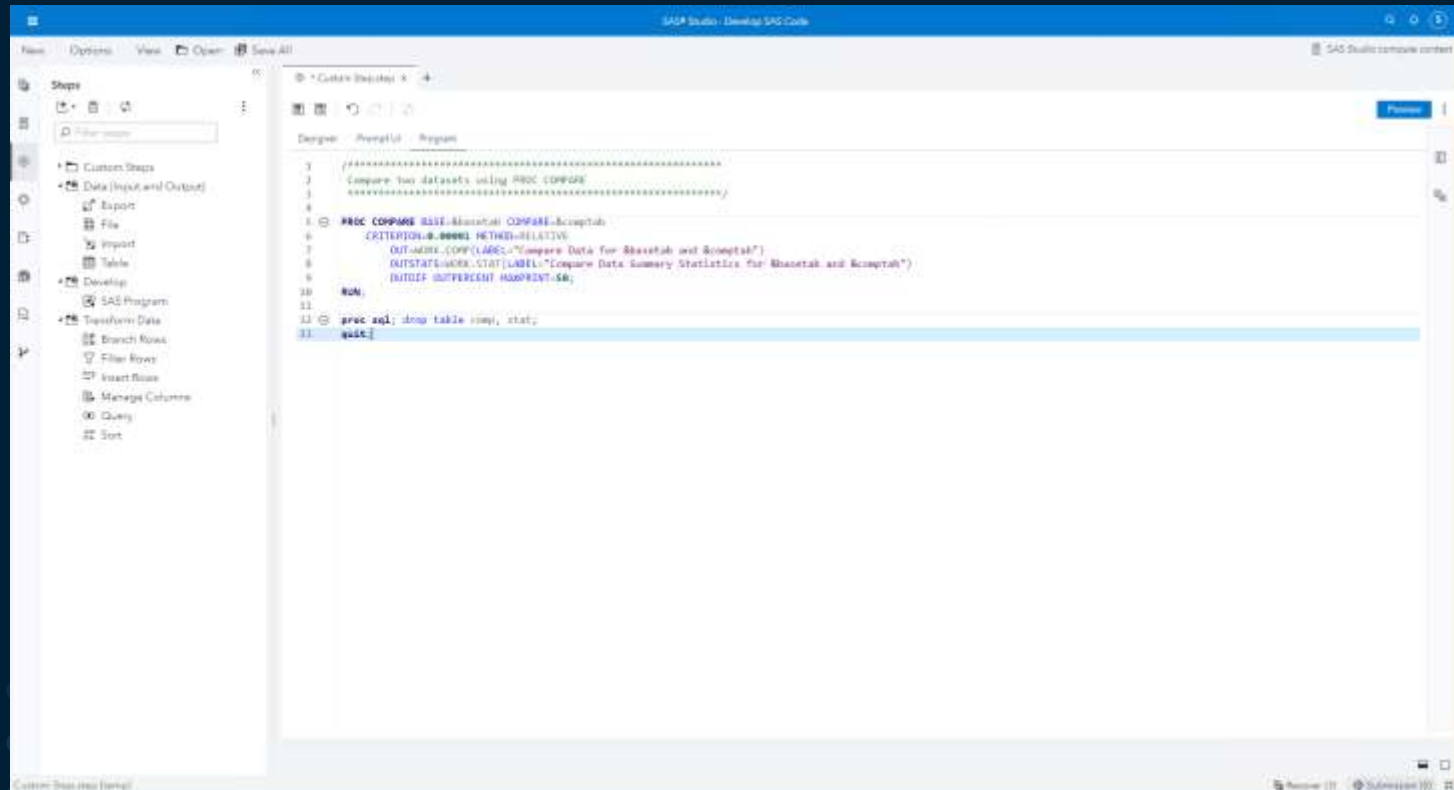






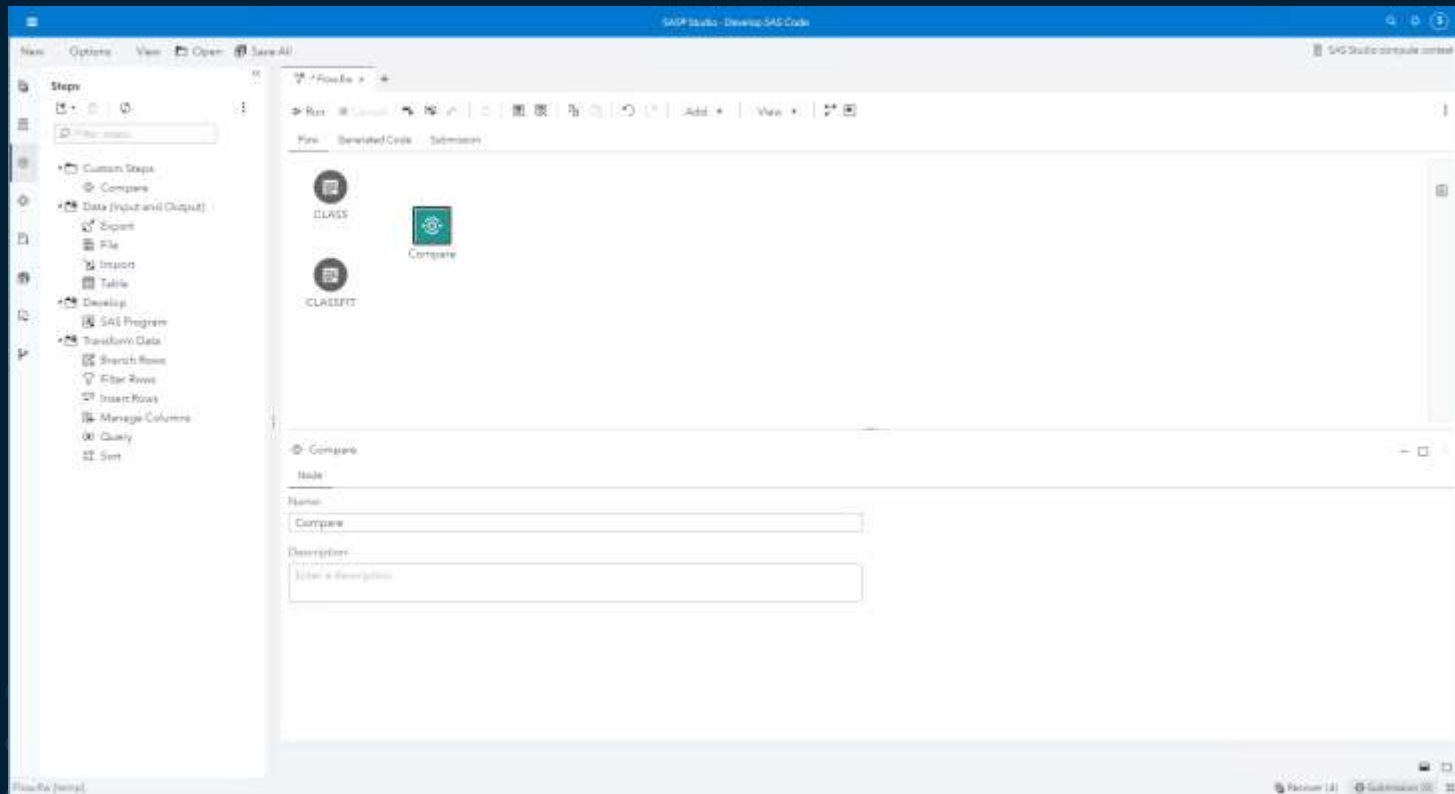
# SAS Studio

## SAS Code



# SAS Studio

## Flow with New Custom Step



# SAS Studio

## Connect

The screenshot displays the SAS Studio interface. On the left is a 'Steps' pane with a tree view containing categories like Custom Steps, Data (Input and Output), Development, and Transform Data. The main workspace shows a workflow with two input steps, 'CLASSFIT' and 'CLASS', both pointing to a 'Compare' step. Below the workflow, the 'CLASS' step's properties are shown in a tabbed interface. The 'Table Properties' tab is active, displaying the following information:

- Library: SASHELP
- Table name: CLASS
- Label: Student Data
- Columns: 5
- Rows: 19
- Date created: (empty)

The bottom status bar indicates 'Recover (0)' and 'Submit (0)'.

# SAS Studio

## Flow Code

The screenshot displays the SAS Studio interface with the Flow Code editor open. The left sidebar shows the 'Steps' panel with various workflow components. The main editor area shows a single DataFlow node with the following properties:

- Flow:** Filter.flow
- ID:** 2021-12-10T18:18:59.268444Z
- Created By:** sasdemo
- Modified By:** sasdemo
- Input Table:** SASHELP.CLASS
- Version:** DataFlow (table 2021.1.) (3018880, 643888674767)
- Generated By:** sasdemo
- Generated On:** 2021-12-10T18:18:59.268444Z

Below the node properties, the 'CLASS' table is displayed with the following structure:

Column	Rows
3	18

The bottom of the interface shows the 'Table Properties' tab for the 'CLASS' table, including fields for Library (SASHELP) and Table name (CLASS).

# SAS Studio

## Output

The screenshot displays the SAS Studio interface with the Output window active. The left sidebar shows the project structure, and the main pane displays the results of a SAS program. The output includes a title, a data set summary table, a variables summary, and an observation summary table.

**The CONFAST Procedure**  
Comparison of SASHELP.CLASSFIT with SASHELP.CLASS  
(Method=RELATIVE, Criterion=0.00001)

**Data Set Summary**

Dataset	Created	Modified	NVar	NObs	Label
SASHELP.CLASSFIT	09JUL11:12:56:01	05JUL12:12:54:01	19	19	Predicted Weights with Confidence Limits
SASHELP.CLASS	08JUL11:15:59:18	04JUL12:13:39:18	8	19	STUDENT DATA

**Variables Summary**

Number of Variables in Column 5,  
Number of Variables in SASHELP.CLASSFIT but not in SASHELP.CLASS: 6.

**Observation Summary**

Observation	Score	Compare
First Obs	1	1
First Unequal	1	1
Last Unequal	13	13
Last Obs	13	13

Number of Observations in Column 19,  
Total Number of Observations Read from SASHELP.CLASSFIT: 19,  
Total Number of Observations Read from SASHELP.CLASS: 13,  
Number of Observations with First Unequal Result: 6

CLASS

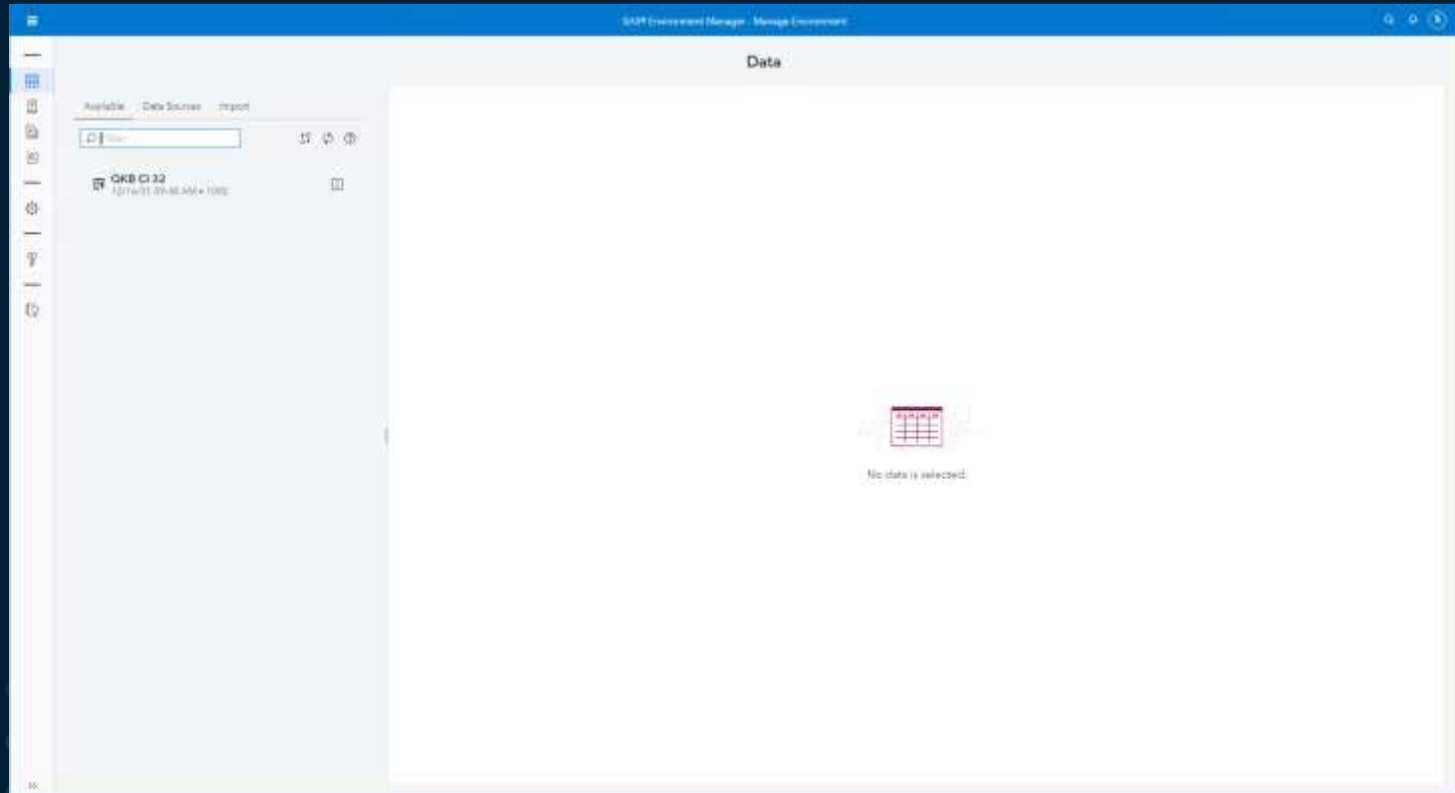
# SAS Studio

## Import Process Flows

- You can import a SAS Enterprise Guide project and have flows created
- For the most part, all Enterprise Guide tasks will be converted to SAS code node in the flow
- Most Query nodes will be converted to Flow Queries
- Tables will come over as tables
- A similar attempt will be made for Imports and Exports
- Currently the conversion is an Administrative function as it requires access to the SAS Environment Manager

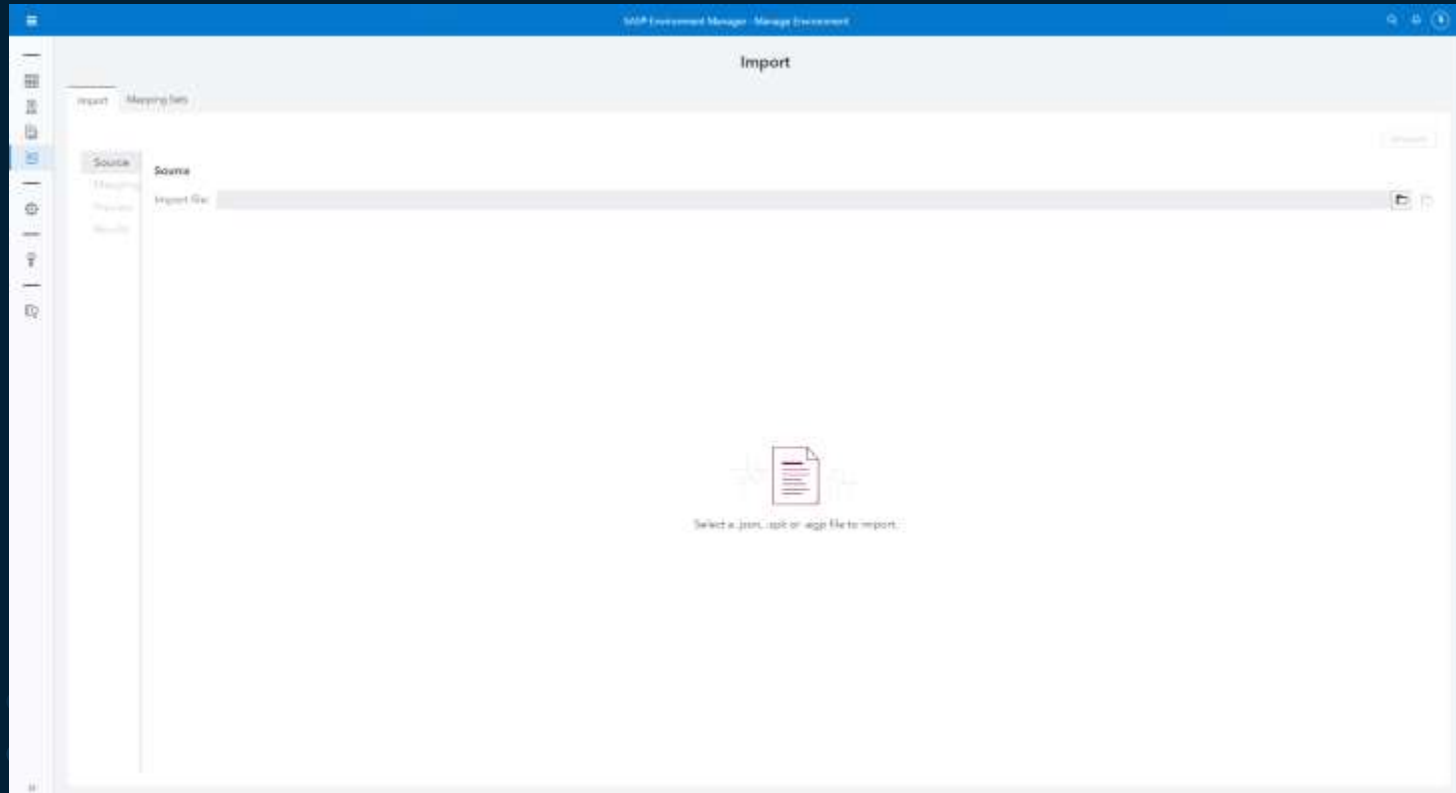
# SAS Studio

## SAS Environment Manager



# SAS Studio

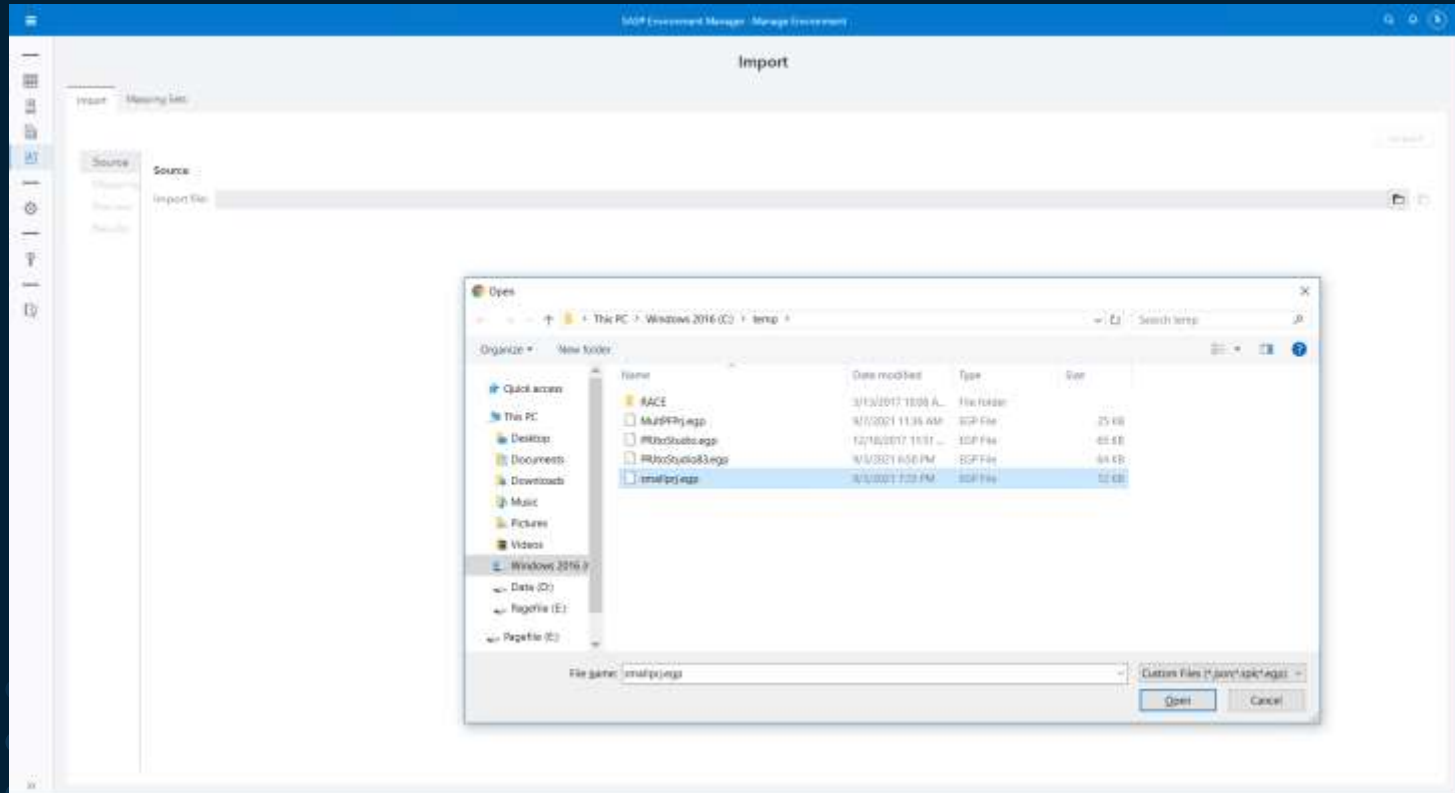
## Import





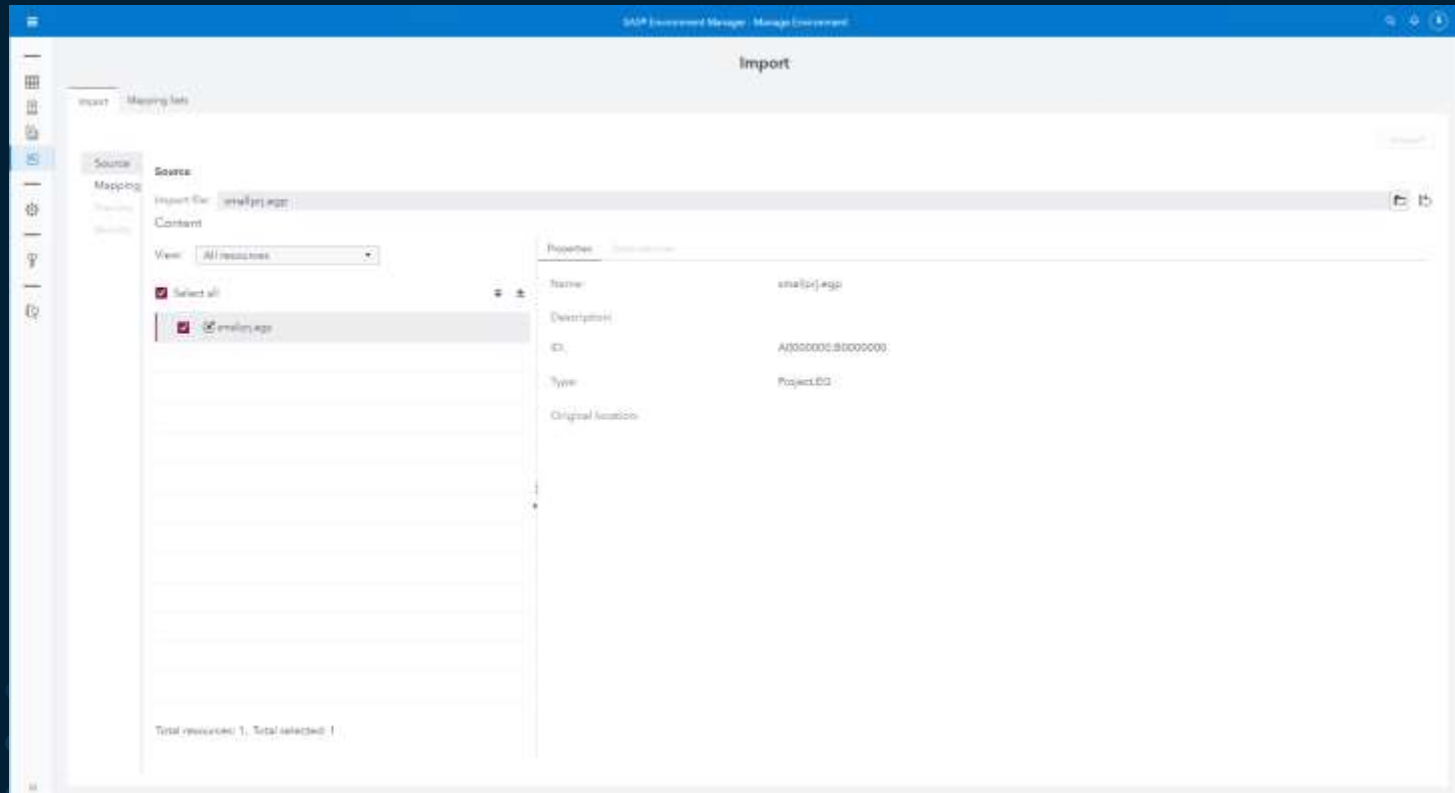
# SAS Studio

## Select



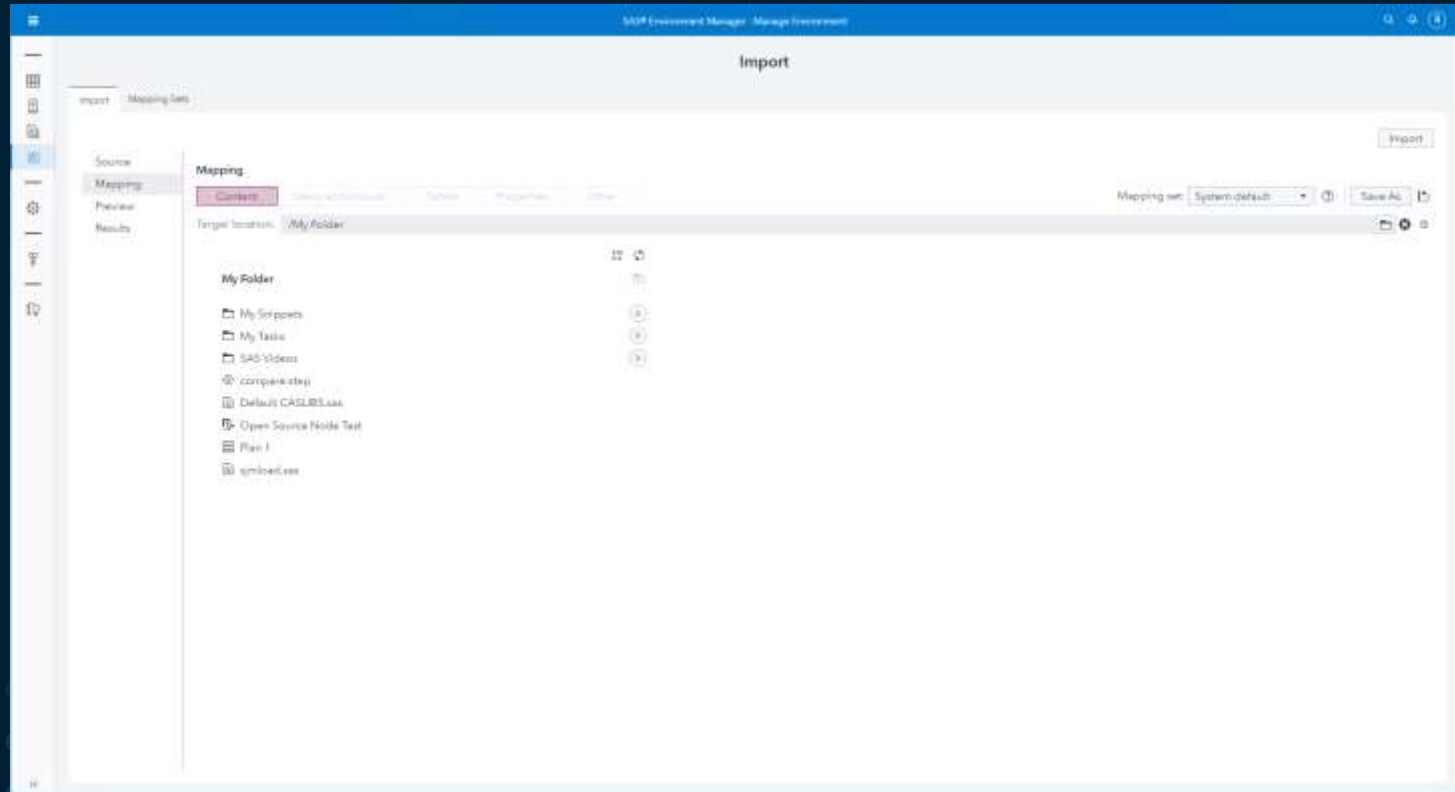
# SAS Studio

## Selected



# SAS Studio

## Import



# SAS Studio

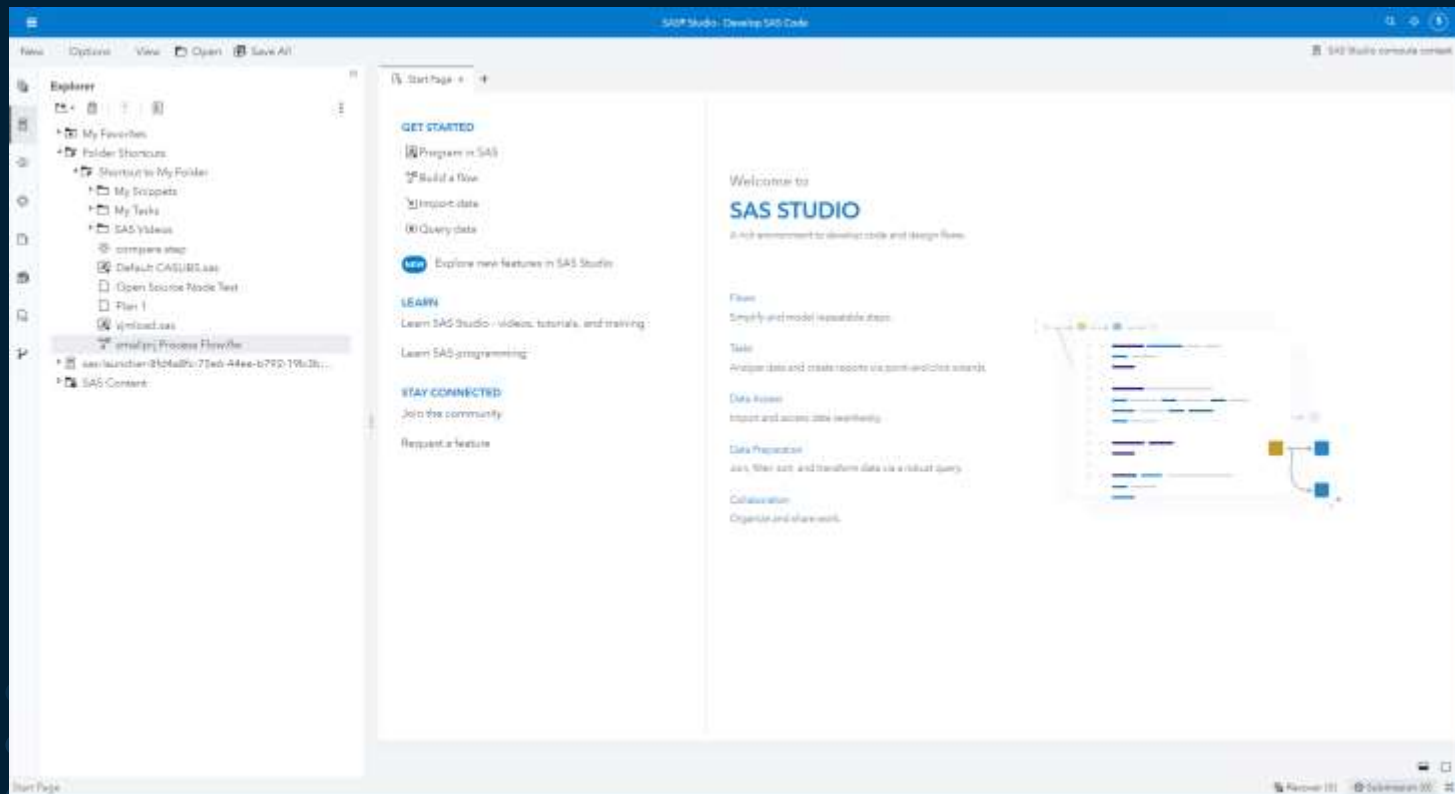
## Completed

The screenshot shows the SAS Studio 'Import' window. The top bar indicates 'SAS Environment Manager - Manage Environments'. The main title is 'Import'. Below the title, there are tabs for 'Import' and 'Mapping Sets'. The 'Results' tab is selected, showing a green banner with a checkmark and the text 'Import job has completed'. Below this, it states 'Total time to import small[er] job: 0:00:05' and provides a 'View log' button. A checkbox for 'Show column abbreviations' is present. The main area contains a table with columns for 'Object Type', 'Completed', 'Warnings', 'Errors', 'Failed', 'Skipped', and 'Stopped'. The first row shows 'C42 Enterprise Guide project' with 1 completed, 0 warnings, 0 errors, 0 failed, 0 skipped, and 0 stopped. The bottom left corner shows 'Count: 1'.

Object Type	Completed	Warnings	Errors	Failed	Skipped	Stopped
C42 Enterprise Guide project	1	0	0	0	0	0

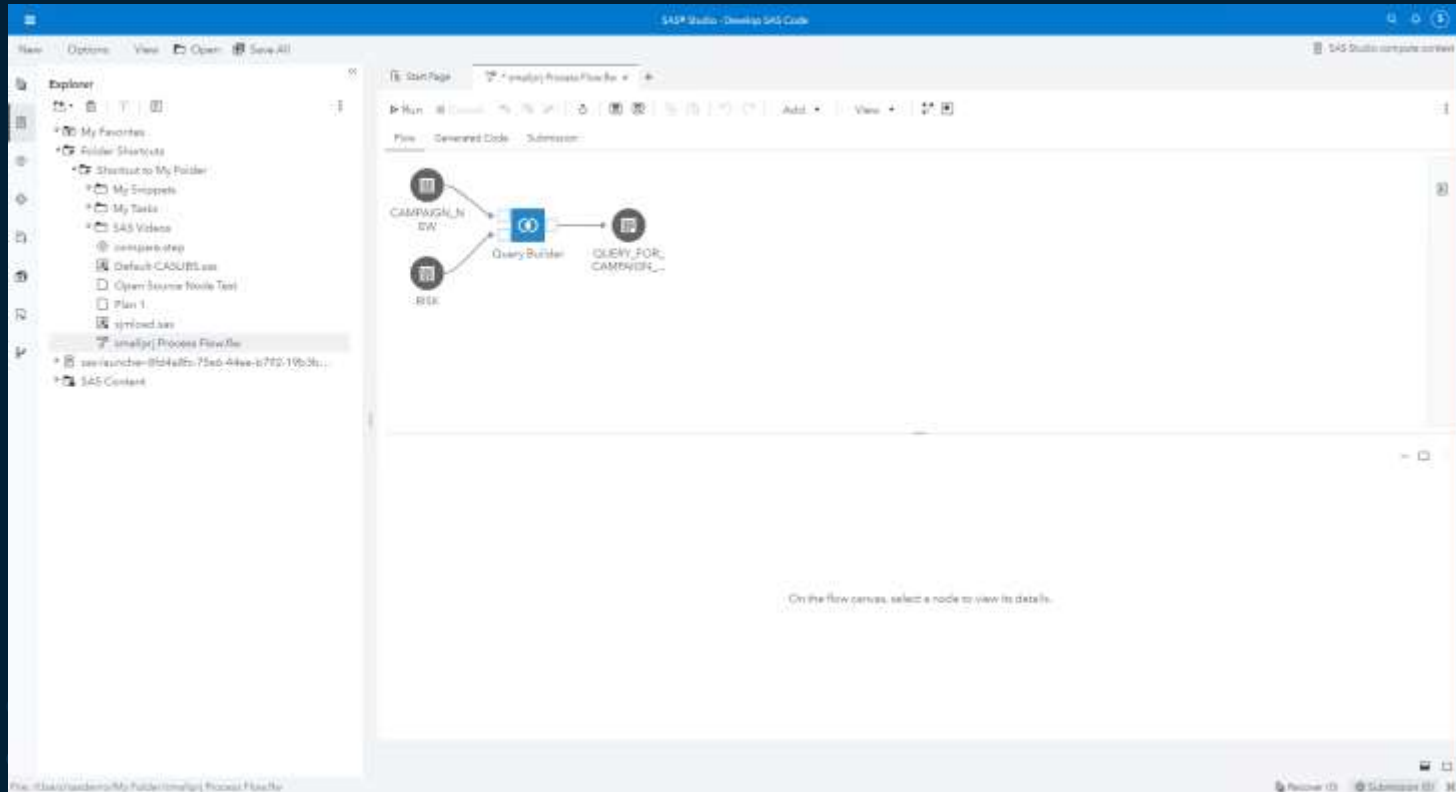
# SAS Studio

## New Flow



# SAS Studio

## Open



# SAS Studio

## Conclusion

- SAS Studio is being improved frequently with monthly releases of Viya
- SAS Studio Analyst
  - Three new steps to manipulate data
  - Custom Steps expand functionality above what SAS provides
- SAS Enterprise Guide projects can be imported into Viya
  - Accomplished via SAS Environment Manager
  - More and expanded options are coming soon

**Thank you for your time and for using SAS!**  
**Stay safe and be well!**

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