

#ExploreSAS

SAS EXPLORE

Level Up Your Skills in AI and Analytics

Sept. 11-14 // Las Vegas



#ExploreSAS

SAS **EXPLORE**

Level Up Your Skills in AI and Analytics



More Goodies in the SAS[®] Extension for Visual Studio Code

Casey Smith, R&D Director, SAS

Abstract

The official SAS Extension for Visual Studio Code continues to grow, making it more enjoyable, convenient and productive to access the power of the SAS platform through programming in Visual Studio Code. This presentation will highlight features and enhancements recently added to the extension. These include greatly simplified authentication, support for SAS 9.4 servers, working with SAS content, navigating SAS libraries, viewing data sets, a notebook experience and more.



Purpose

What it is and why it matters

Getting Started

Installing, familiarizing, and configuring

Capabilities

What can I accomplish



Purpose

What it is and why it matters

What is it?

- An extension in Visual Studio Code
- Surfaces SAS capabilities
- An Open Source project developed and maintained in GitHub

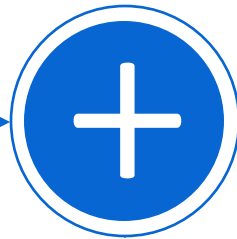
Purpose

The best of both worlds



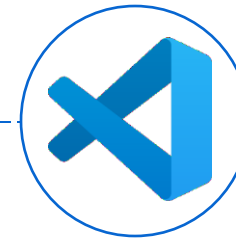
SAS

Powerful end-to-end AI
and Analytics Platform



SAS Extension for
Visual Studio
Code

Combines the power of both,
meeting you where you work



Visual Studio
Code

Powerful, popular,
highly extensible
development
environment

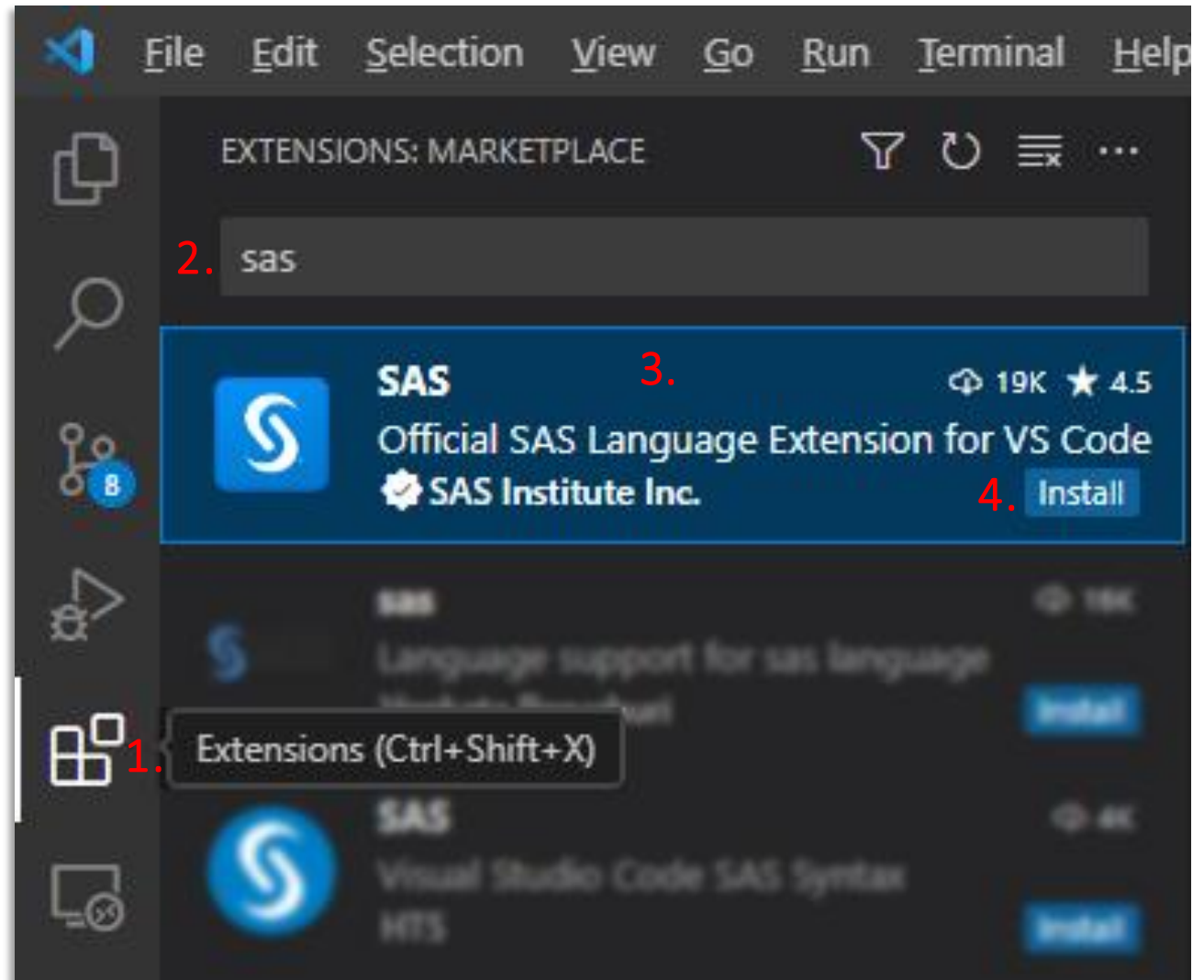


Getting Started

Installing, familiarizing, and configuring

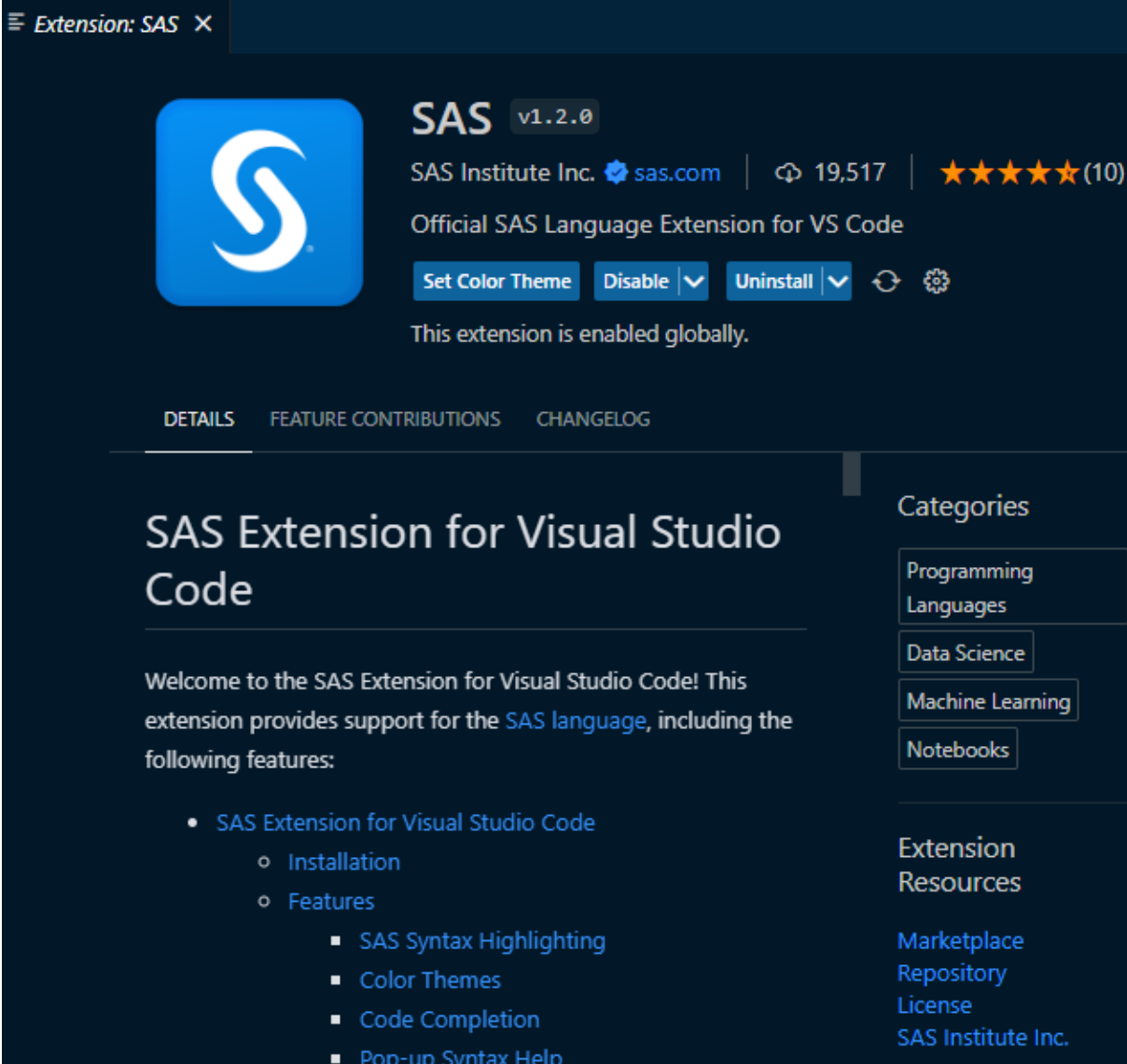
Installing the Extension

1. Activate the **Extensions** pane
2. Type **sas** in the search field
3. Select **SAS**, the **Official SAS Language Extension for VS Code**
4. Click **Install** button



Familiarizing

- Details
 - Introduction
 - User-friendly summary of features
 - Documentation
 - README.md
- Feature Contributions
- Changelog
- Extension Resources



The screenshot shows the 'Extension: SAS' page in Visual Studio Code. At the top, the extension is identified as 'SAS v1.2.0' by 'SAS Institute Inc.' with a link to 'sas.com'. It has 19,517 installations and a 5-star rating from 10 reviews. The extension is described as the 'Official SAS Language Extension for VS Code'. Below this, there are buttons for 'Set Color Theme', 'Disable', and 'Uninstall'. A message states 'This extension is enabled globally.' The page has tabs for 'DETAILS', 'FEATURE CONTRIBUTIONS', and 'CHANGELOG'. The main content area is titled 'SAS Extension for Visual Studio Code' and includes a welcome message: 'Welcome to the SAS Extension for Visual Studio Code! This extension provides support for the SAS language, including the following features:'. A list of features is provided: 'SAS Extension for Visual Studio Code' (with sub-items 'Installation' and 'Features'), 'SAS Syntax Highlighting', 'Color Themes', 'Code Completion', and 'Pop-up Syntax Help'. On the right side, there are sections for 'Categories' (Programming Languages, Data Science, Machine Learning, Notebooks) and 'Extension Resources' (Marketplace Repository, License, SAS Institute Inc.).

Workspace

The screenshot displays the SAS Studio workspace with several components:

- Code:** A SAS program in the editor window titled "sgplot example - histogram of sepal length.sas". The code includes a title, data source, histogram and density plots grouped by species, and a legend.
- Data:** A data table in the center showing the first five rows of the SASHELP.IRIS dataset.
- Results:** A histogram titled "Histogram of Sepal Length" showing the distribution of sepal length for three species: Setosa, Versicolor, and Virginica.
- Libraries/Tables:** A sidebar on the left showing a list of SAS libraries and tables.
- Log:** A terminal window at the bottom showing the execution of the SAS program and the resulting HTML output.

#	Species	Sepal Length	Sepal Width
1	Setosa	50.4	3.4
2	Setosa	46.0	3.4
3	Setosa	46.3	3.6
4	Setosa	51.0	3.3
5	Setosa	55.4	3.5

```
1 title "Histogram of Sepal Length";
2 proc sgplot data=sashelp.iris;
3   histogram sepallength / group=species transparency=0.5 scale=count;
4   density sepallength / type=normal group=species;
5   keylegend / location=inside position=topright across=1;
6 run;
7 title;
```

```
16 ;run;quit;ods html5 close;
17 ods html5;
18 Writing HTML5 Body file: sashtml1.htm
19 title "Histogram of Sepal Length";
20 proc sgplot data=sashelp.iris;
21   histogram sepallength / group=species transparency=0.5 scale=count;
22   density sepallength / type=normal group=species;
23   keylegend / location=inside position=topright across=1;
24 run;
```

NOTE: PROCEDURE SGPLOT used (Total process time):

Configuring Server Connections

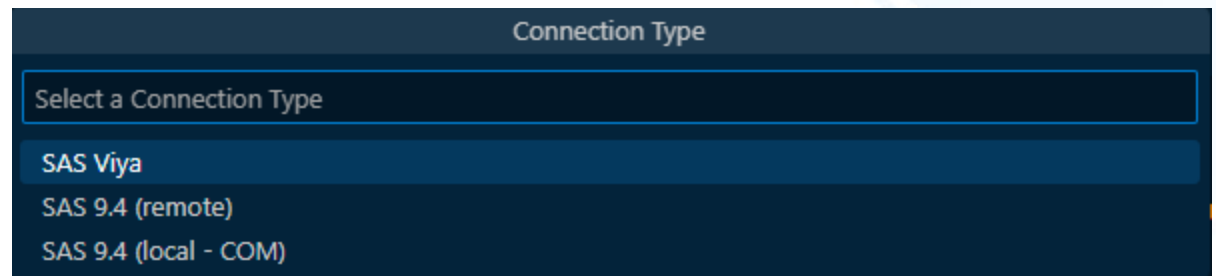
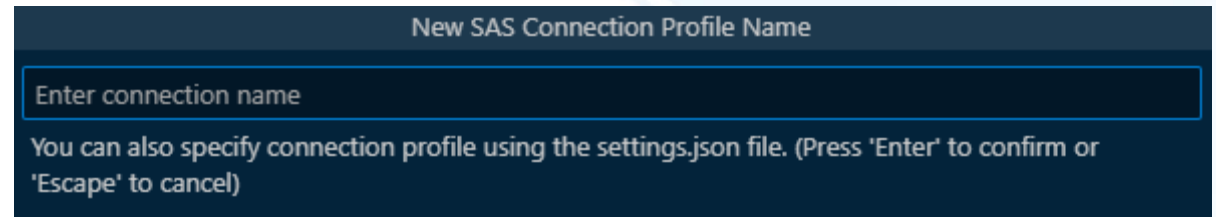
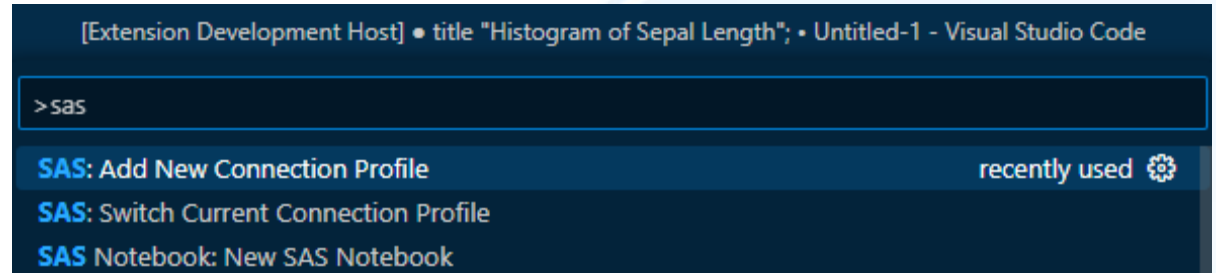
Supported Connection Types

- SAS Viya
 - Supports Viya 4 and Viya 3.5
 - Via REST
- SAS 9.4 (remote)
 - Via SSH
 - Requires keys configured in OpenSSH
- SAS 9.4 (local)
 - SAS installed on your local Windows machine
 - Via COM/IOM
 - Requires SAS Integration Technologies Client

Configuring Server Connections

Add New Connection Profile

1. Click **View->Command Palette**
2. Type **sas** to filter
3. Select **SAS: Add New Connection Profile**
4. Specify any connection profile name and press **Enter**
5. Select desired connection type



Configuring Server Connections

Add New Viya Connection Profile

6. Specify URL to your Viya server
7. Accept the default or change the Compute Context
8. Accept the default (blank) client ID, unless you created a specific one (ex. Viya 3.5 or Viya 4 prior to 2022.11)

SAS Viya Server

Enter the URL

Enter the URL for the SAS Viya server. An example is <https://example.sas.com>. (Press 'Enter' to confirm or 'Escape' to cancel)

SAS Compute Context

SAS Job Execution compute context

Enter the SAS compute context. (Press 'Enter' to confirm or 'Escape' to cancel)

Client ID

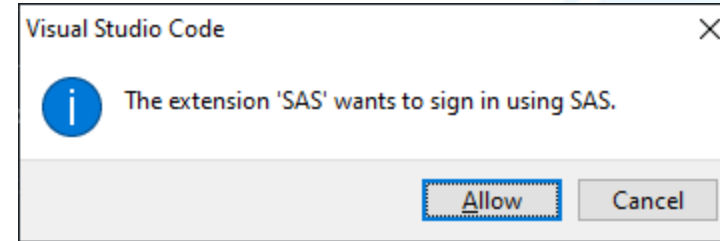
Enter a client ID

Enter the registered client ID. An example is `myapp.client`. (Press 'Enter' to confirm or 'Escape' to cancel)

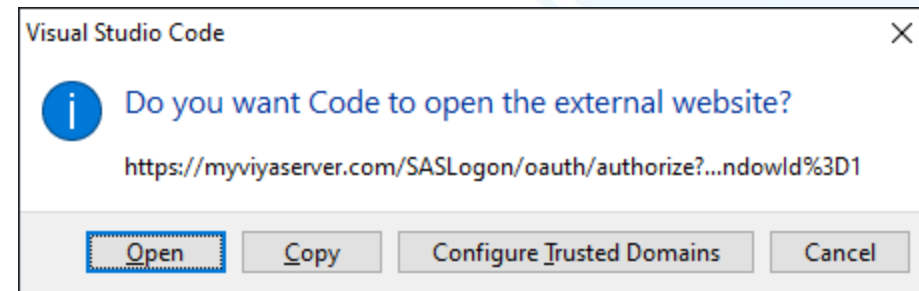
Configuring Server Connections

Add New Viya Connection Profile

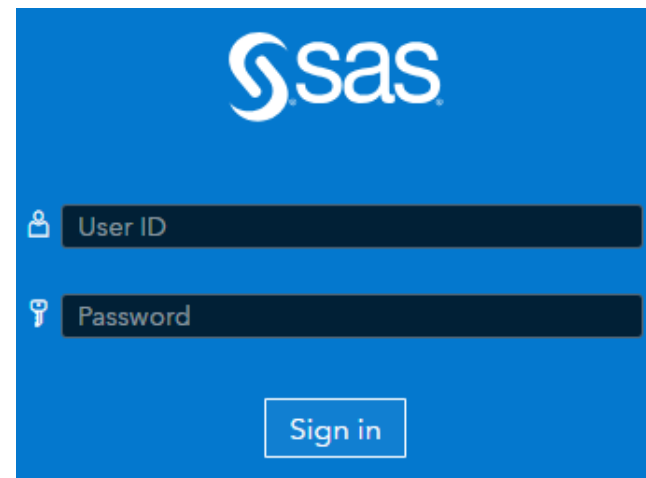
9. Click **Allow** button



10. If prompted, confirm to **Open** external website



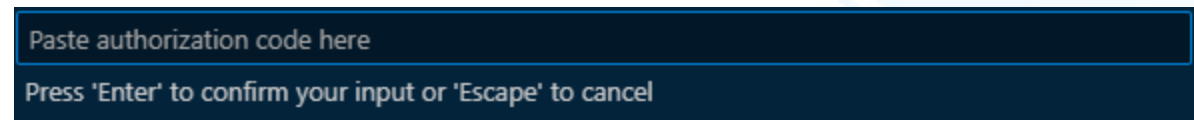
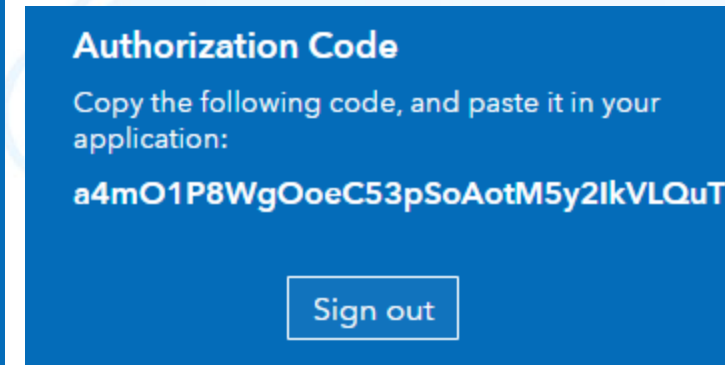
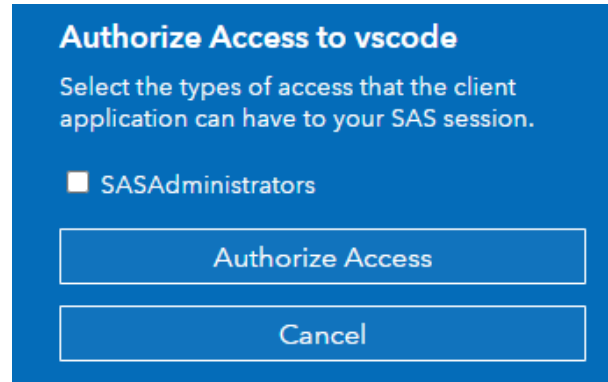
11. **Sign in** on SAS logon page that opens in browser



Configuring Server Connections

Add New Viya Connection Profile

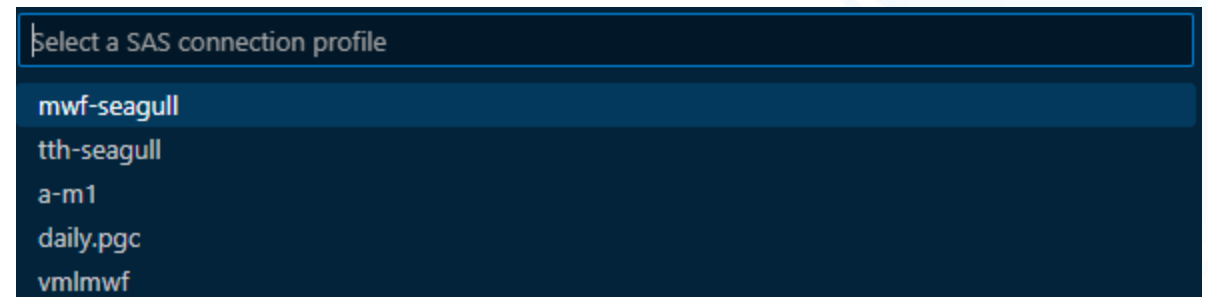
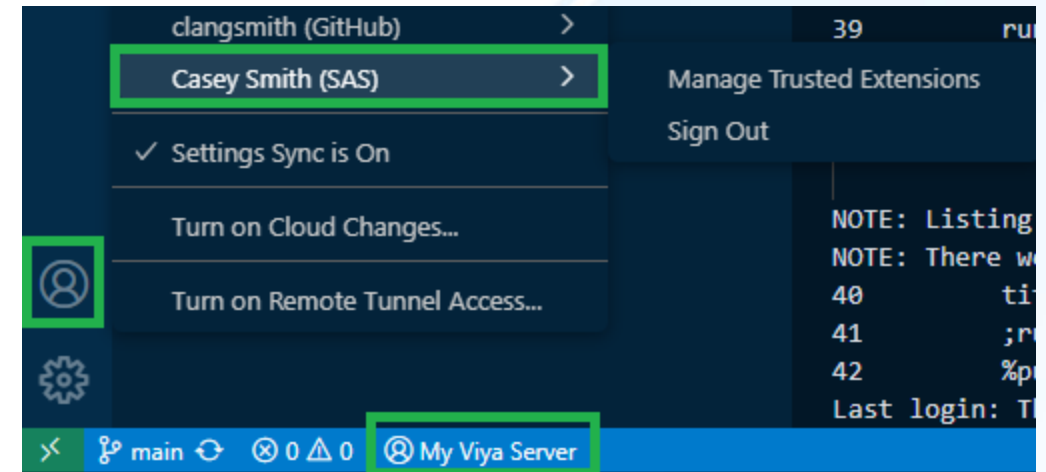
12. Check desired access type and click **Authorize Access**
13. Copy the authorization code that is displayed
14. Switch back to VS Code, paste in the authorization code, and press **Enter**
15. You should now be connected!



Configuring Server Connections

Managing Connection Profile

- Can confirm logged in status and sign out on Accounts menu
 - Re-authenticate once every 90 days by default for Viya 4
- Active profile on status bar
 - Clicking runs **Switch Connection Profile** command



Configuring Server Connections

Optional session startup options

- Autoexec
 - Run lines or files of code at startup
 - Currently only valid with Viya connections
- SAS Options
 - Initialize SAS system options
 - Valid with all connection types
- Set manually in settings.json

```
settings.json
C: > Users > cassmi > AppData > Roaming > Code > User > settings.json > {} [json] > edito

41     },
42     "cublax02.unx.sas.com": {
43         "connectionType": "ssh",
44         "host": "cublax02.unx.sas.com",
45         "saspath": "/opt/sas/SASHome/SASFoundation/9.4/sas",
46         "username": "cassmi",
47         "port": 22,
48         "sasOptions": ["MPRINT", "VALIDMEMNAME=EXTEND"],
49     },
50     "Local V9": {
51         "connectionType": "com",
52         "sasOptions": ["MPRINT", "MLOGIC", "SYMBOLGEN"],
53         "host": "localhost"
54     },
55     "cisviya": {
56         "connectionType": "rest",
57         "endpoint": "https://cisviya.sas.com",
58         "autoExec": [
59             { "type": "line", "line": "libname mylib '/tmp';" },
60             { "type": "file", "filePath": "/tmp/vscodeAutoexec.sas" }
61         ],
62         "sasOptions": ["ECHOAUTO", "VALIDVARNAME=ANY"]
63     }
}
```

Settings

- Connection Profiles
- User-provided certificates
- Enable HTML results
- HTML style
 - Match VS Code color theme by default (auto)

The screenshot shows the Visual Studio Code Settings interface for the SAS extension. The search bar at the top left contains the text "sas". The left sidebar lists various settings categories, with "SAS (4)" highlighted at the bottom. The main content area displays the following settings:

- SAS: Connection Profiles**
Define the connection profiles to connect to SAS servers. If you define more than one profile, you can switch between them.
[Edit in settings.json](#)
- SAS: User Provided Certificates**
Provide trusted CA certificate files
C:\Users\cassmi\ssh_cisviya.sas.crt
[Add Item](#)
- SAS > Results > HTML: Enabled**
 Enable/disable ODS HTML5 output
- SAS > Results > HTML: Style**
Specifies the style for ODS HTML5 results.
(auto)



Capabilities

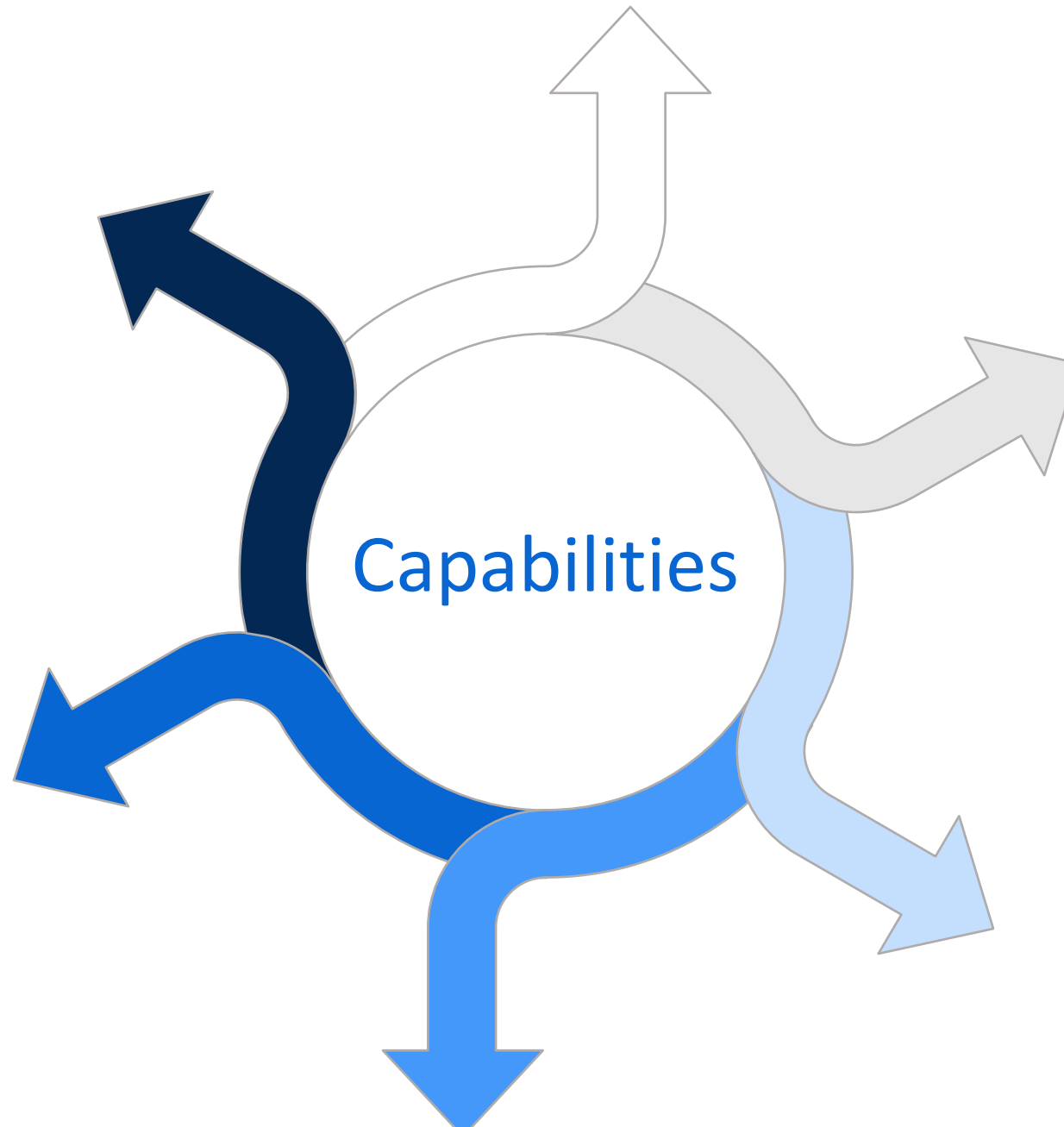
What can I accomplish

Write Code

Develop code in SAS and Python using a powerful and popular industry IDE, with corresponding editor and syntax features.

Run Code

Run the code seamlessly against your Viya 4, Viya 3.5, or SAS 9 environment. View log and results.



View Data

Navigate libraries and view data directly in VS Code.

Create Notebooks

Create cell-based notebooks with a combination of SAS, Python, SQL, and markdown.

Share

Access and store your code and other assets in SAS Content, which can be seamlessly accessed in SAS Studio and other Viya applications.

Write Code

- SAS Syntax Highlighting
- Color Themes
- Code Completion
- Pop-up Syntax Help
- Snippets
- Code Folding and Code Outline
- Built-in VS Code features

```
title "Histogram of Sepal Length"; Untitled-1
1 title "Histogram of Sepal Length";
2 proc sgplot data=sashelp.iris;
3     histogram sepallength / group=species transparency=0.5 scale=count;
4     density sepallength / type=normal group=species;
5     keylegend / location=inside position=topright across=1;
6 run;
7 title;
8
9 proc mea
10     means
11 proc sgp mtlearn
12 histogra modelmatrix
13 density migrate
14 run; mianalyze
15
```

Keyword: MEANS
**Context: [PROCEDURE DEFINITION] PROC MEANS **

Syntax:

```
PROC MEANS <options> <statistic-keywo
ATTRIB variable-list(s) attribute
BY <DESCENDING> variable-1 <<DESCE
CLASS variable(s) </ options>;
FORMAT variable-1 < ...variable-n>
FREQ variable;
ID variable(s);
LABEL variable-1=label-1< ...varia
OUTPUT <OUT=SAS-data-set> <output-
<id-group-specification(s)> <m
<minimum-id-specification(s)>
TYPES request(s);
VAR variable(s) </ WEIGHT=weight-v
WAYS list;
WEIGHT variable;
WHERE where-expression-1
<logical-operator where-express
```

Computes descriptive statistics for variables.

Run Code

- Run Selected or All SAS Code (F3 or 'running man icon' on toolbar)
- Run All SAS Code (F8)
- Run Region
- Log printed to OUTPUT view
- ODS results displayed in new adjacent tab group
- Able to cancel running job

The screenshot displays the SAS Studio interface. The main editor shows SAS code with a 'running man' icon highlighted in a green box. A 'Result' window is open, showing the output of the 'proc means' procedure. The 'OUTPUT' view at the bottom shows the SAS Log with a 'SAS code running...' message and a 'Connecting to SAS session...' message, both highlighted in green boxes. A 'Cancel' button is also highlighted in a green box.

```
1 title "Histogram of Sepal Length"
2 proc sgplot data=sashelp.cars;
3   histogram sepallength / density;
4   density sepallength / keylegend / location=inside;
5   keylegend / location=inside;
6 run;
7 title;
8
9 proc means data=sashelp.cars;
10 run;
11
12 title "Distribution of Car MSRP"
13 proc sgplot data=sashelp.cars;
14   histogram msrp;
15   density msrp;
16 run;
```

Distribution of Car MSRP			
The MEANS Procedure			
Variable	Label	N	Mean
MSRP		428	30261.5
Invoice		428	30261.5
EngineSize	Engine	428	3.1
Cylinders	Size (L)	426	5.8
Horsepower		428	215.8
MPG_City		428	20.0
MPG_Highway	MPG (City)	428	26.8
Weight	MPG	428	3500
Wheelbase	(Highway)	428	108.1
Length	Weight	428	186.3

OUTPUT

```
139
140 ;run;quit;ods html5 close;
141 ods html5 sty
NOTE: Writing HTML
142 proc means da
143 run;
```

SAS code running...
Source: SAS (Extension) [Cancel]

Connecting to SAS session...

View Data

- View and navigate libraries
- Open data sets in infinite scrollable data grid
- View/compare multiple data sets at same time
- Download data sets as .csv
- Drag tables into code as `<libref>.<member>`

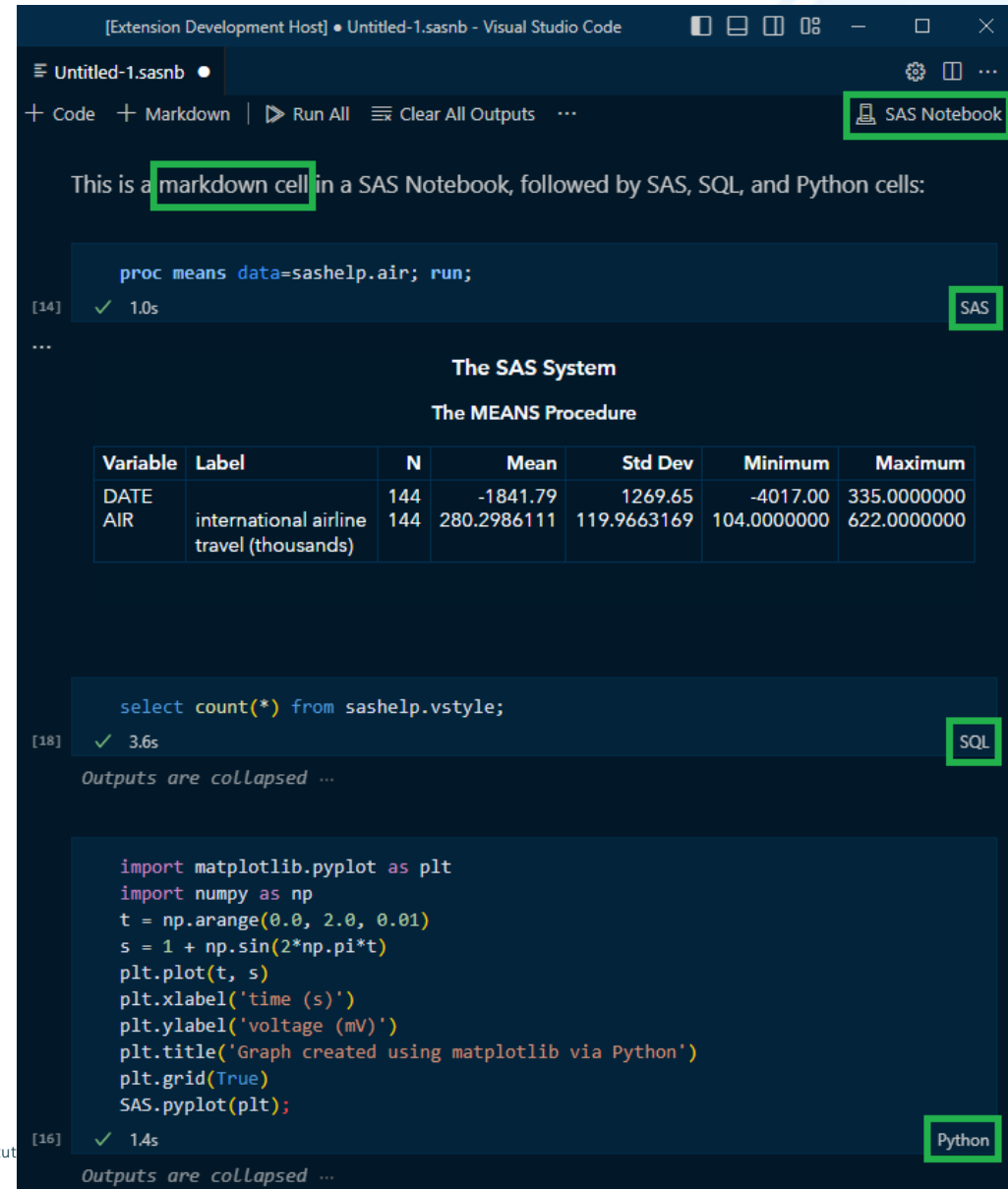
The screenshot displays the SAS Explore interface. On the left, the 'LIBRARIES' pane is expanded to show the 'SASHELP' library, with the 'AIRLINE' member selected. A 'Download' button is visible next to it. The main area shows two data grids. The top grid, titled 'SASHELP.AIRLINE', has columns for '#', 'DATE', and 'AIR'. The bottom grid, titled 'SASHELP.BASEBALL', has columns for '#', 'Name', 'Team', and 'N At Bat'. The interface includes a top navigation bar, a left sidebar with icons, and a bottom status bar.

#	DATE	AIR
1	JAN49	112
2	FEB49	118
3	MAR49	132
4	APR49	129
5	MAY49	131

#	Name	Team	N At Bat
1	Allanson, Andy	Cleveland	293
2	Ashby, Alan	Houston	315
3	Davis, Alan	Seattle	479
4	Dawson, Andre	Montreal	496
5	Colangelo, Ar	Montreal	321

Create Notebooks

- Click **View->Command Palette**
- Type **sas** to filter
- Select **SAS Notebook: New SAS Notebook**
- Supported cell languages
 - SAS, Python, SQL, Markdown
- Click cell language to switch type



The screenshot shows the Visual Studio Code interface with a SAS Notebook open. The notebook contains three cells:

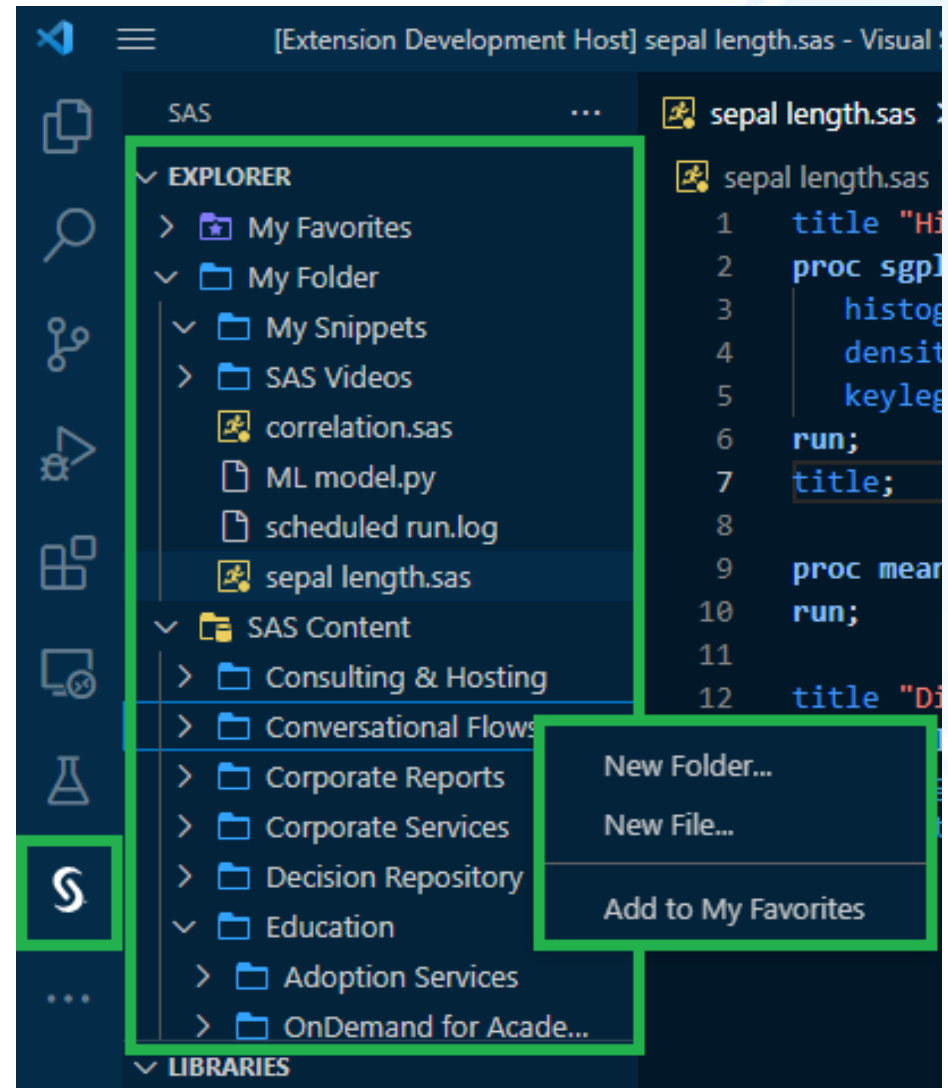
- Cell 1 (SAS):** Contains the SAS code `proc means data=sashelp.air; run;`. The output shows the results of the MEANS procedure for the variable AIR.
- Cell 2 (SQL):** Contains the SQL code `select count(*) from sashelp.vstyle;`. The output is collapsed.
- Cell 3 (Python):** Contains Python code for plotting a sine wave using matplotlib. The output is collapsed.

The interface includes a top bar with a 'SAS Notebook' button, a toolbar with 'Code', 'Markdown', 'Run All', and 'Clear All Outputs' buttons, and a status bar at the bottom showing the current cell's language and execution time.

Variable	Label	N	Mean	Std Dev	Minimum	Maximum
DATE		144	-1841.79	1269.65	-4017.00	335.0000000
AIR	international airline travel (thousands)	144	280.2986111	119.9663169	104.0000000	622.0000000

Share

- Open, create, and save content in SAS Content
- Seamlessly share with SAS Studio and other Viya apps
- Add to Favorites
- Recycle Bin support
- Preview editor support



Contribute

- Now fully open source (Apache 2.0 license)
- Public GitHub project/repository:
<https://github.com/sassoftware/vscode-sas-extension>
- Participation and community contributions welcomed
- Localizations



It's loveliness increases!

Ten releases since last year's SAS Explore and more to come.



SAS **EXPLORE**

Copyright © SAS Institute Inc. All rights reserved.

sas

#ExploreSAS

SAS EXPLORE

Level Up Your Skills in AI and Analytics

Sept. 11-14 // Las Vegas

