



MATLAB/Simulink R2023a 新功能分享

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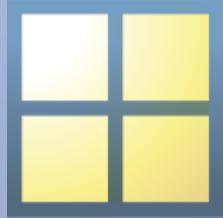


3,662





Ease of Use



double



739,036



```
>> datestr(739036)
```

```
ans =
```

```
'30-May-2023'
```

```
>>
```



```
>> todays_date = datetime('today')
```

```
todays_date =
```

datetime

```
'30-May-2023'
```

```
>> todays_date - 3
```

```
ans =
```

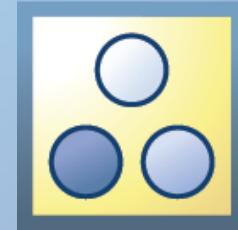
datetime

```
'27-May-2023'
```

```
>>
```



Ease of Use



categorical



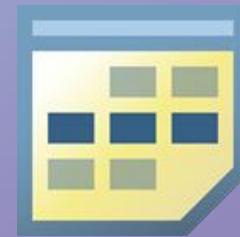
table



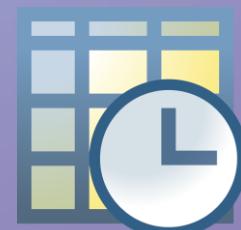
datetime



duration



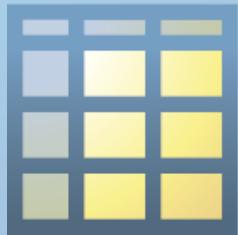
calendarDuration



timetable



string

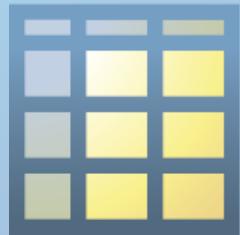


table

patients X

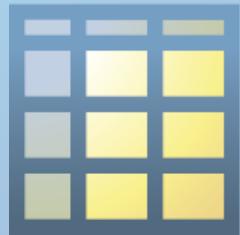
100x9 [table](#)

	1	2	3	4	5	6	7	8	9
	LastName	Age	Location	Height	Weight	Smoker	Systolic	Diastolic	SelfAssessedHealthStatus
1	"Smith"	38	County General Hospital	71	176	"true"	124	93	Excellent
2	"Johnson"	43	VA Hospital	69	163	"false"	109	77	Fair
3	"Williams"	38	St. Mary's Medical Center	64	131	"false"	125	83	Good
4	"Jones"	40	VA Hospital	67	133	"false"	117	75	Fair
5	"Brown"	49	County General Hospital	64	119	"false"	122	80	Good
6	"Davis"	46	St. Mary's Medical Center	68	142	"false"	121	70	Good
7	"Miller"	33	VA Hospital	64	142	"true"	130	88	Good
8	"Wilson"	40	VA Hospital	68	180	"false"	115	82	Good
9	"Moore"	28	St. Mary's Medical Center	68	183	"false"	115	78	Excellent
10	"Taylor"	31	County General Hospital	66	132	"false"	118	86	Excellent
11	"Anderson"	45	County General Hospital	68	128	"false"	114	77	Excellent



table

```
>> scaledScores = testScores .* .25  
  
scaledScores =  
  
7x3 table  
  
Test1    Test2    Test3  
-----  -----  -----  
22.5    21.75   23.25  
21.75   21.25   20.75  
21.5    21.25    22  
18.75    20      18  
22.25   21.5    21.75  
24       23      24.5  
19.5    18.75   19.25  
  
>> meanScores = mean(scaledScores)  
  
meanScores =  
  
1x3 table  
  
Test1    Test2    Test3  
-----  -----  -----  
21.464   21.071  21.357  
  
>>
```



table

Region	Color	Units
North	Red	10
North	Green	25
North	Red	45
South	Green	35
South	Green	15
South	Red	60
East	Red	80
East	Green	55
East	Green	30
West	Red	90
West	Green	75
West	Red	45

pivot
→

Region	Red	Green
North	25	55
South	50	60
East	85	80
West	75	135



timetable

```
>> weatherData  
  
weatherData =  
  
    12×2 timetable with  
  


| Time        | Temperature | Humidity |
|-------------|-------------|----------|
| 01-Nov-2022 | 36          | 45       |
| 02-Nov-2022 | 31          | 76       |
| 03-Nov-2022 | 37          | 43       |
| 04-Nov-2022 | 36          | 46       |
| 05-Nov-2022 | 38          | 72       |
| 06-Nov-2022 | 32          | 54       |
| 07-Nov-2022 | 35          | 50       |
| 08-Nov-2022 | 34          | 45       |
| 09-Nov-2022 | 32          | 72       |
| 10-Nov-2022 | 30          | 58       |
| 11-Nov-2022 | 39          | 54       |
| 12-Nov-2022 | 34          | 58       |

  
>> snowEvents = weatherData(eventfilter("Snow"),:)  
  
snowEvents =  
  
    1×2 timetable with 4 events  
  


| Time             | Temperature | Humidity |
|------------------|-------------|----------|
| Snow 08-Nov-2022 | 34          | 45       |

  
>>
```



dictionary

```
>> starsDictionary = dictionary(hrStars.ID, hrStars.Name)

starsDictionary =

    dictionary (double --> string) with 332 entries:

    897 --> "Acamar"
    472 --> "Achernar"
    219 --> "Achird"
    5984 --> "Acrab"
    :
    :
    4357 --> "Zosma"
    5531 --> "Zubenelgenubi"
    5787 --> "Zubenelhakrabi"
    5685 --> "Zubeneschamali"

>> starsDictionary([897 4301 6812 4357]')

ans =

    4×1 string array

    "Acamar"
    "Dubhe"
    "Polis"
    "Zosma"

>>
```

Types



Bus



Connection Bus



Value Type



Alias Type



Numeric Type



Enum Type



Type Editor - Manage Types

TYPE EDITOR

Sources

Contents of 'Base Workspace'

Filter contents

Property Inspector

Simulink.BusElement: Chirp

Properties

Name: Chirp

Data type: double

Complexity: real

Dimensions: 1

Dimensions mode: Fixed

Minimum: 0

Maximum: 0

Unit:

Description:

Name	Type	Complexity	Dimensions	Dimensions mode
mech	Connection: found...			
elec	Connection: found...			
Chirp	double	real	1	Fixed
Sine	double	real	1	Fixed
Step	double	real	1	Fixed
myFixptAlias	fixdt(0,16,7)			
s16En15	Single			
windVelocity	single	real	[2.4 3]	Fixed

Ready

New Open Save Import

Bus Connection Bus Alias Type Value Type

Move Up Move Down Cut Copy Paste Delete

All Columns Export MATLAB Structure

ADD EDIT VIEW SHARE

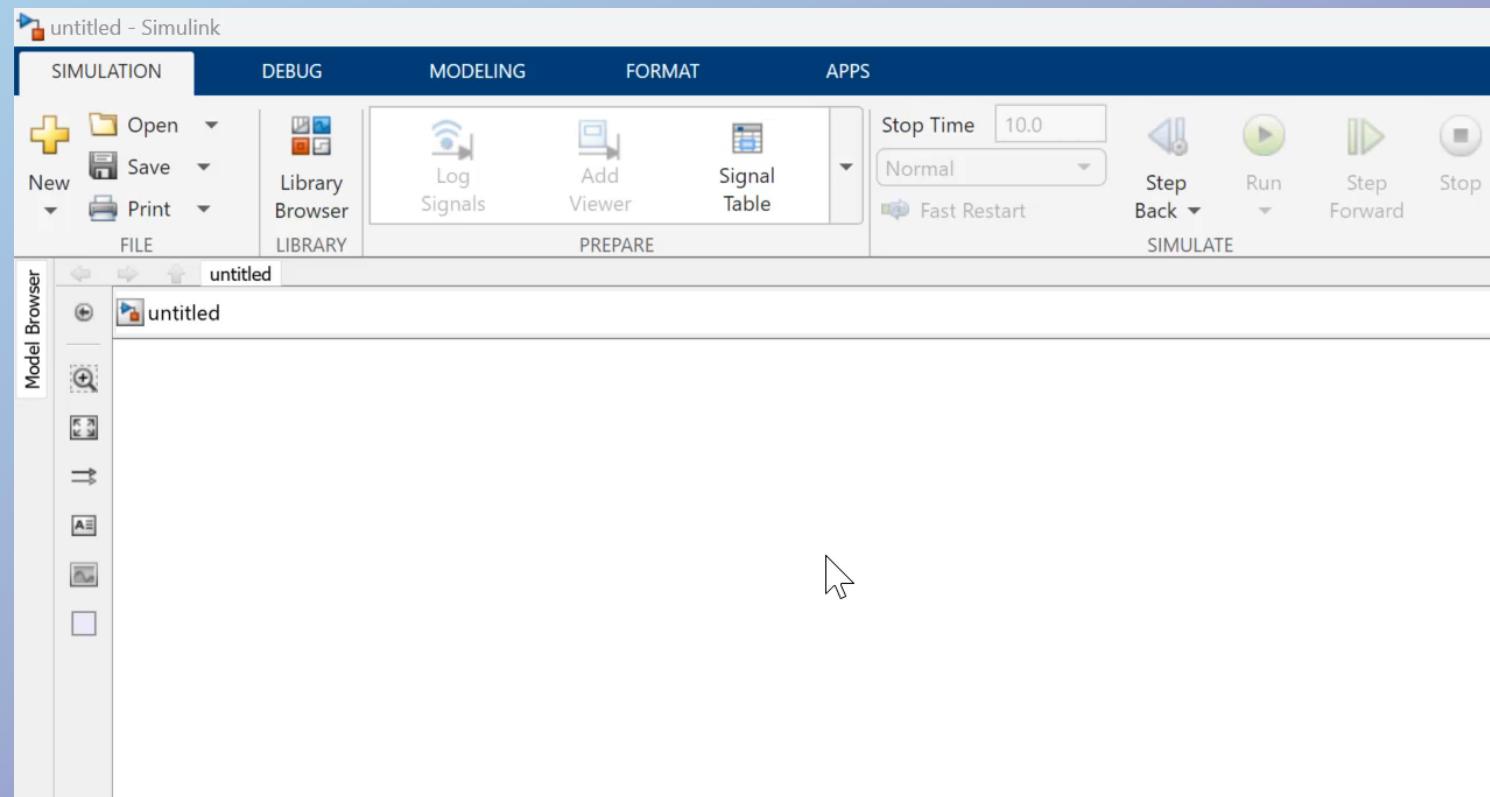
Detailed description: This screenshot shows the MATLAB Type Editor interface. The left pane displays the 'Base Workspace' with various data types like 'MechElec', 'NestedBus', and 'TopBus'. The 'NestedBus' section contains 'Chirp', 'Sine', and 'Step' signals. The 'TopBus' section contains a 'NestedBus' object and other variables like 'myFixptAlias', 's16En15', and 'windVelocity'. The right pane shows the properties for the selected 'Chirp' entry, including its name, data type (double), complexity (real), dimensions (1), and dimensions mode (Fixed). The 'Property Inspector' also shows fields for minimum and maximum values, unit, and description.

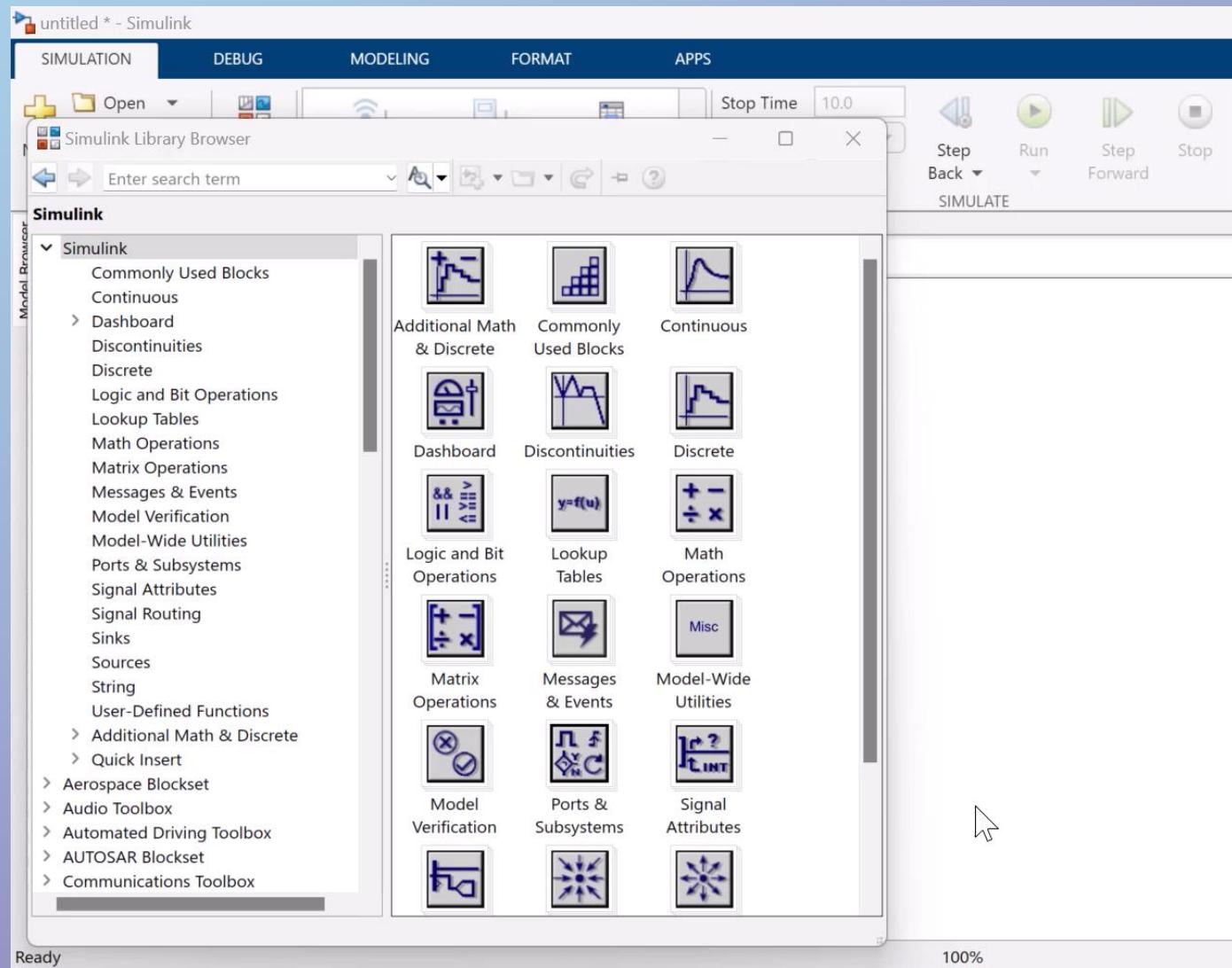


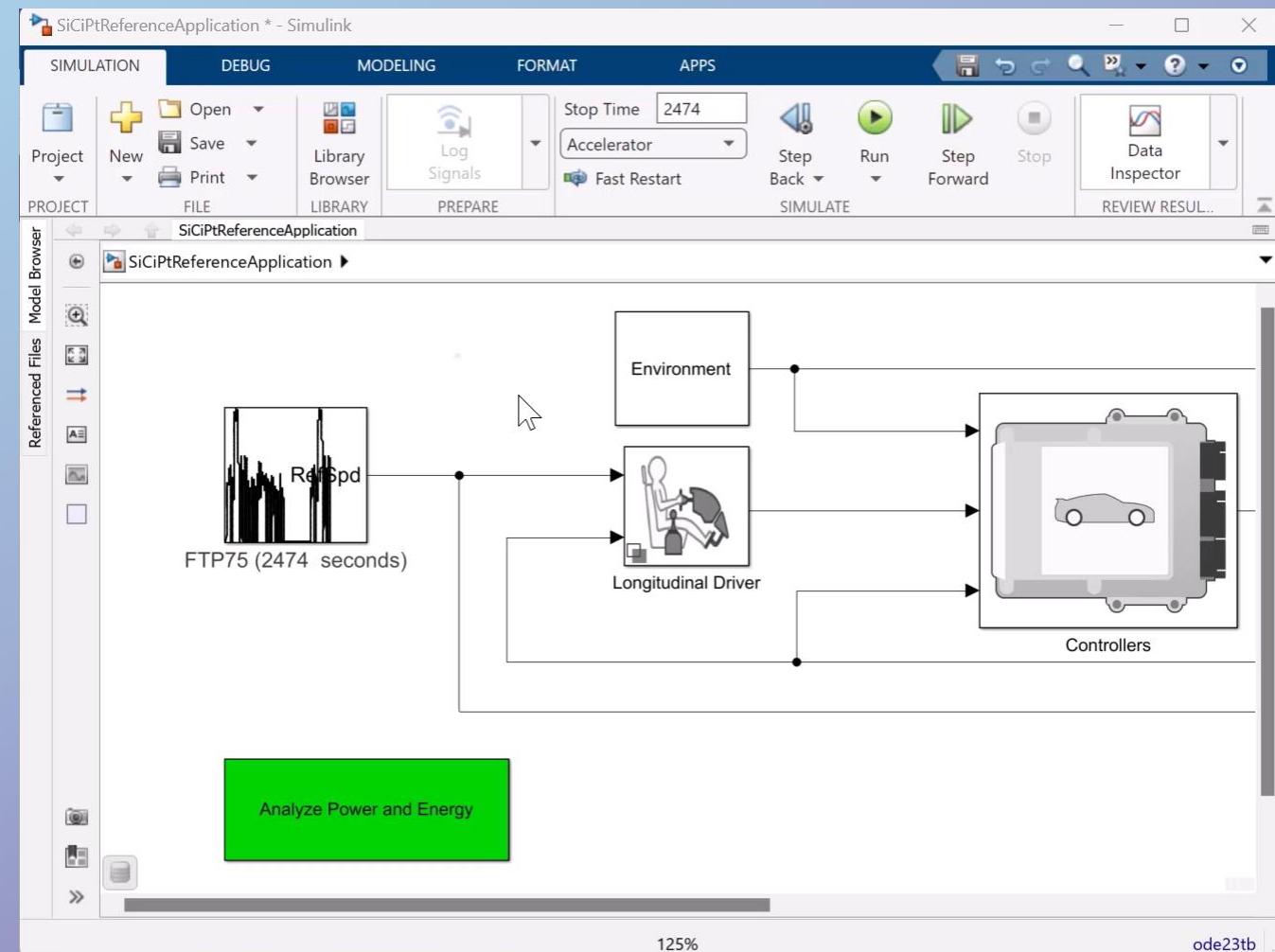
简化您的工作



Ease of Use









低代码能力



Ease of Use





Ease of Use

★ FAVORITES



Curve Fitter



Optimization



PID Tuner



System
Identification



Wireless
Waveform G...



Signal
Analyzer



Instrument
Control



SimBiology
Model Builder



SimBiology
Model Analy...



MATLAB Coder



Application
Compiler



Analog Input
Recorder



Analog
Output Gen...



Modbus
Explorer



Web App
Compiler

MATLAB



Class Diagram
Viewer



Code Analyzer



Code
Compatibilit...



Data Cleaner



Dependency
Analyzer



Profiler



Test Browser

MACHINE LEARNING AND DEEP LEARNING



Classification
Learner



Deep Network
Designer



Deep Network
Quantizer



Experiment
Manager



Neural Net
Clustering



Neural Net
Fitting



Neural Net
Pattern Rec...



Neural Net
Time Series



Regression
Learner



Reinforcement
Learning De...



Data Analytics - Load Forecasting Case Study

Load messy data

```
load LETdata.mat  
head(nyiso)
```

Missing Data

Clean Missing Data

Find, fill, or remove missing data

Select data

Input data X-axis default

Specify method

Cleaning method

Visualize results

Cleaned data Filled missing entries

ans = 8x11 timetable

	Date	CAPITL	CENT
1	05/01/2007 ...	981.9000	1.571
2	05/01/2007 ...	991.8000	1.568
3	05/01/2007 ...	950.1000	1.560
4	05/01/2007 ...	968.9000	1.560
5	05/01/2007 ...	968.5000	1.555
6	05/01/2007 ...	949.2000	1.564
7	05/01/2007 ...	941.6000	1.538
8	05/01/2007 ...	939.4000	1.557



Import Data

AllNumbers = Table with 7 columns imported from AllNumbers.xlsx

▼ Select source

File C:\Users\qnazir\Downloads\App_Datasets\AllNumbers [Browse...](#)

Type: Microsoft Excel Worksheet, Size: 10 KB

Sheet Sheet1 ▾

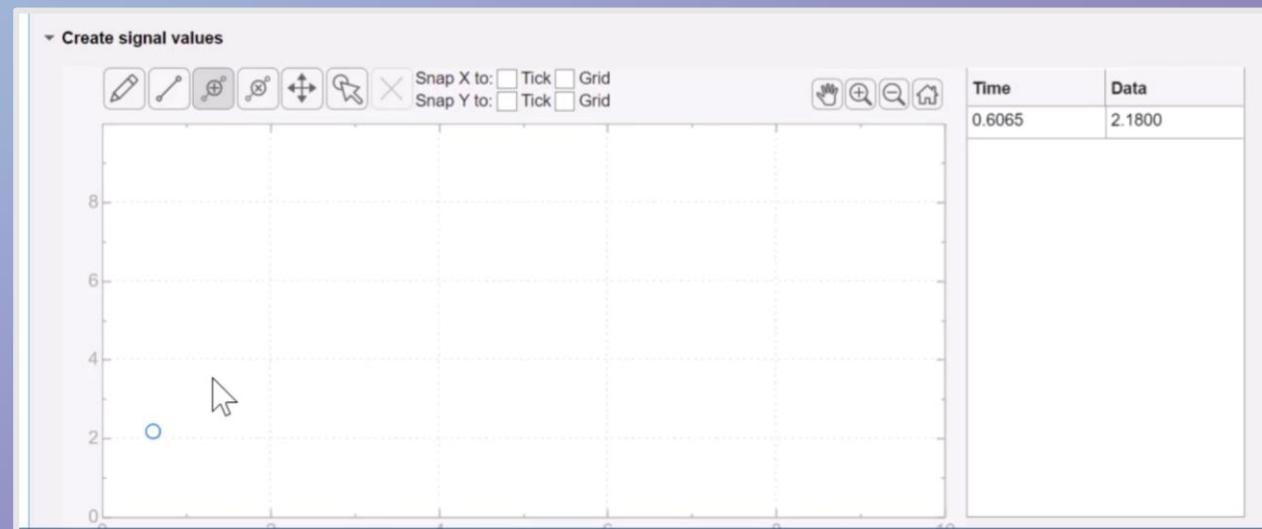
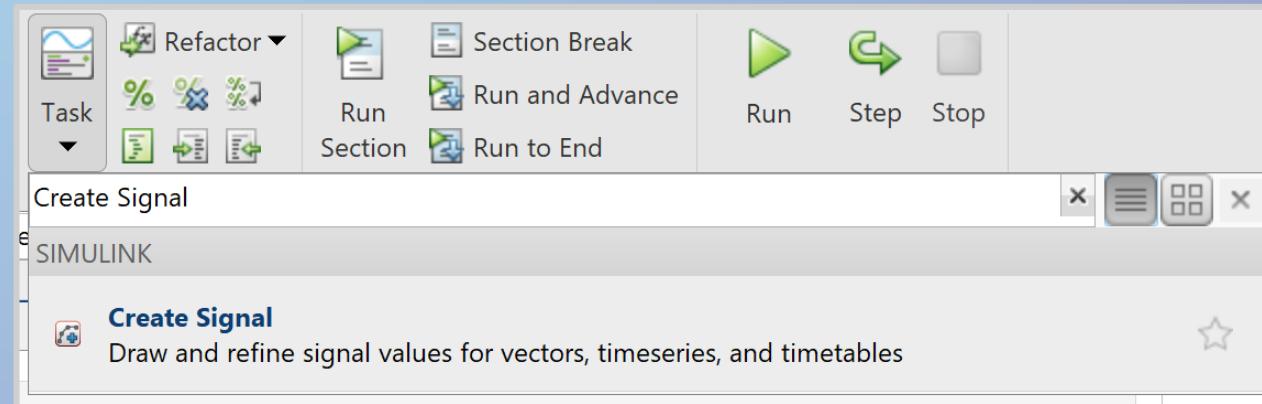
▼ Specify imported variable type

Type Table ▾

► Display results

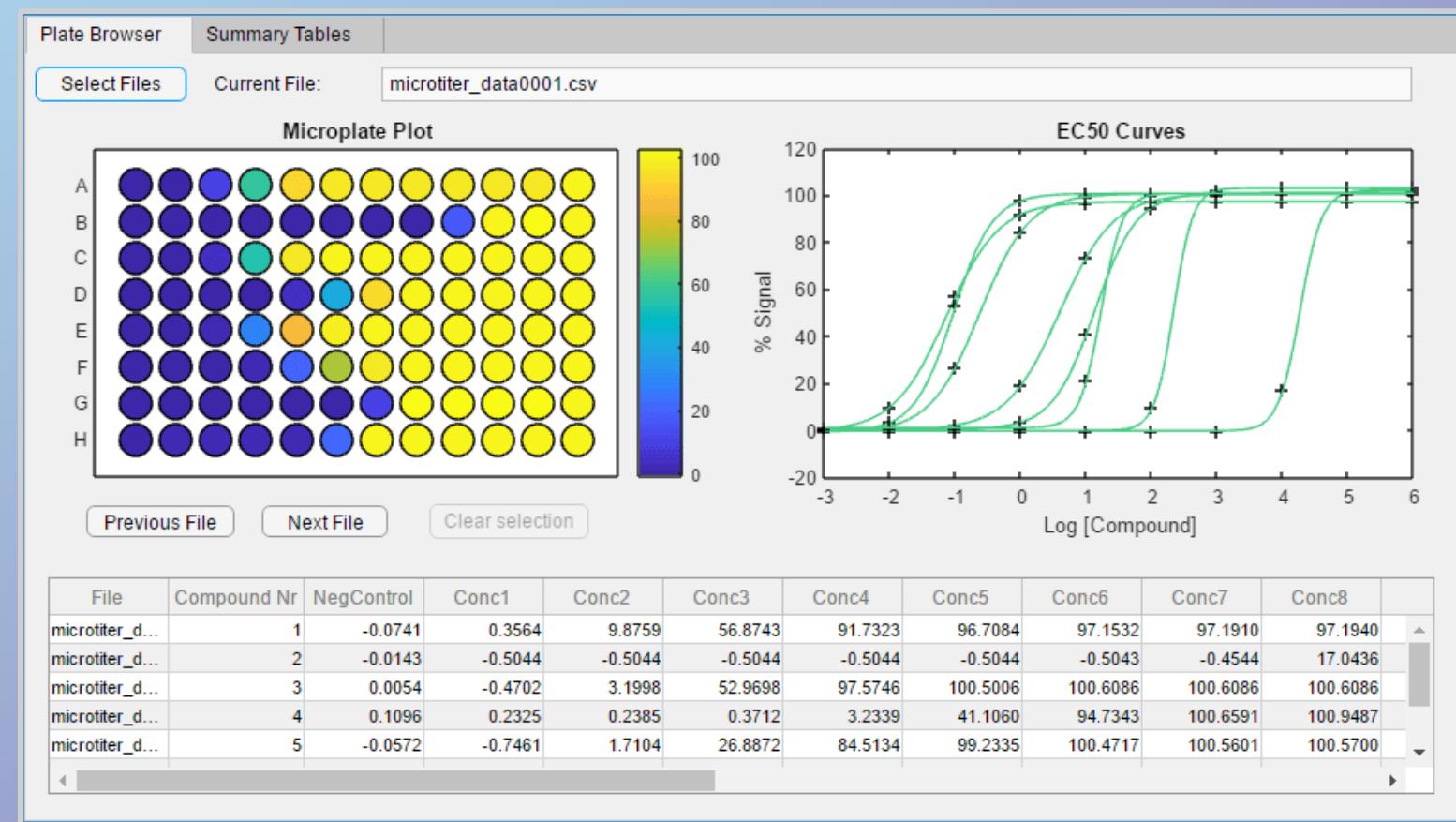
AllNumbers = 29x7 table

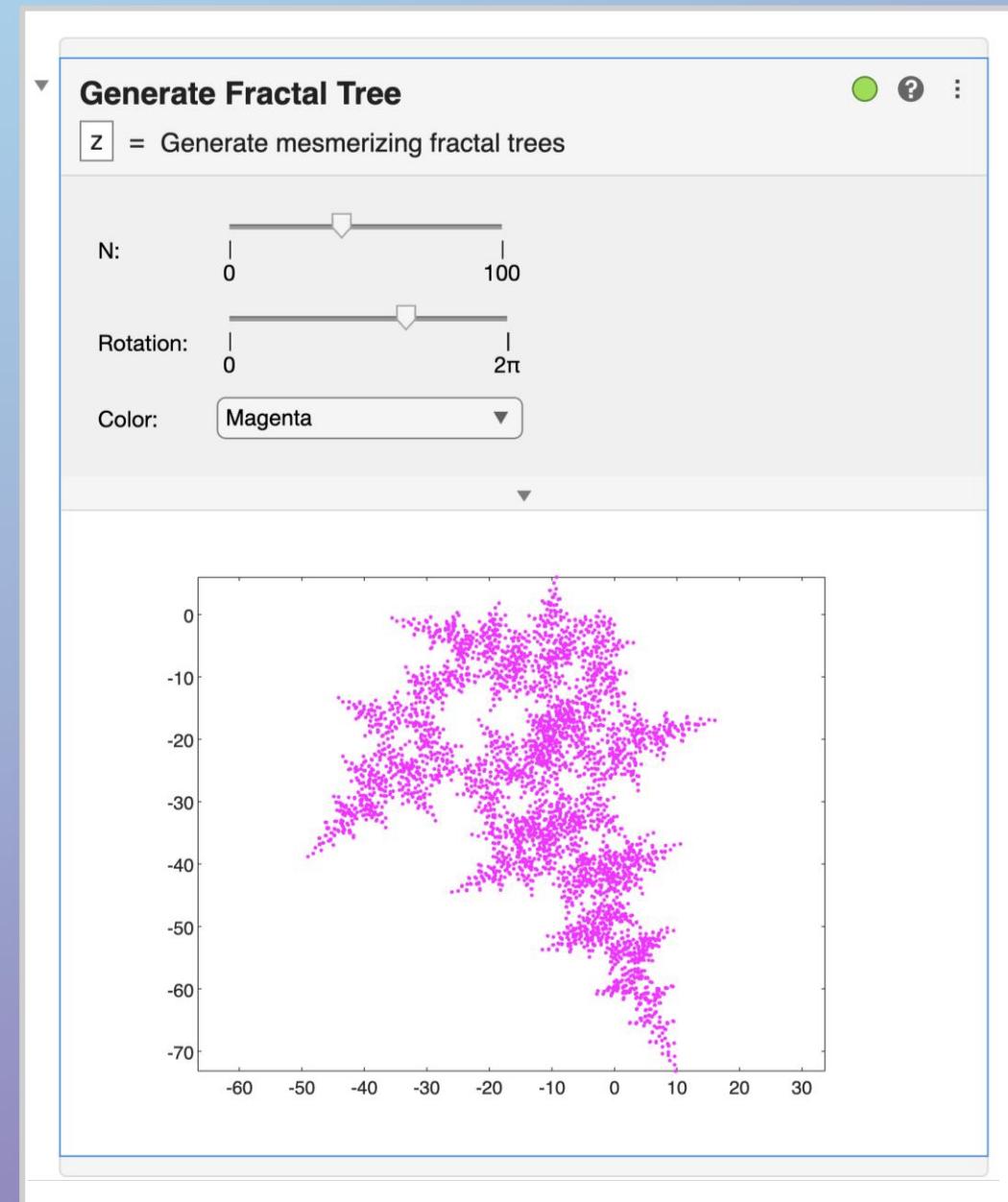
	Var1	Var2	Var3	Var4	Var5	Var6	Var7
1	1	1	6	7	0	52.6900	-8.7600
2	1	1	7	7	0	55.3400	-8.0400
3	1	1	8	7	0	57.9500	-8.2000
4	1	1	9	7	0	62.3800	-7.6900
5	1	1	10	7	0	66.3000	-7.0600
6	1	1	11	7	0	67.9500	-6.0900
7	1	1	12	7	0	68.4000	-5.5200
8	1	1	13	7	0	67.5000	-5
9	1	1	14	7	0	66.2000	-4.3900





自定制开发能力



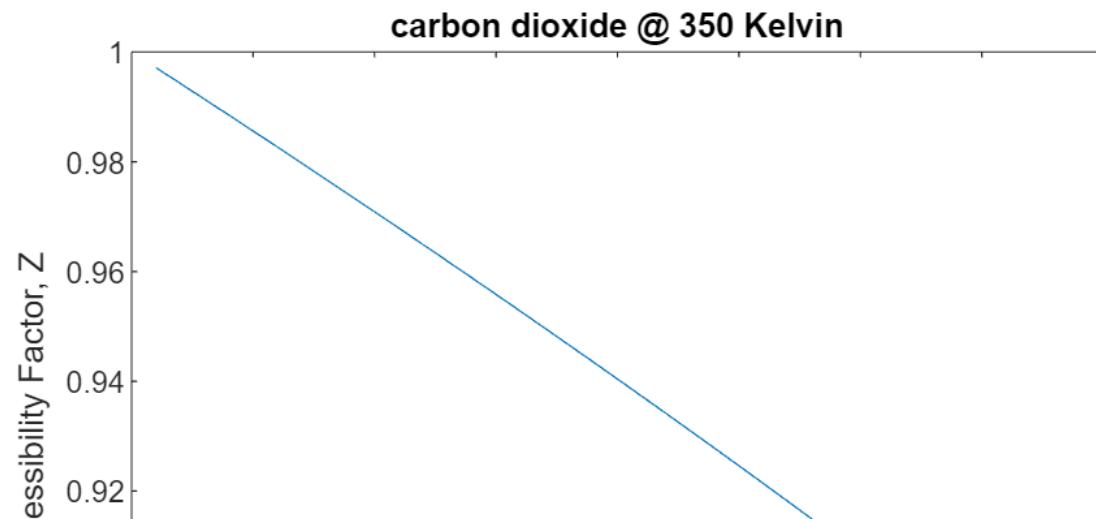


```
gas = "carbon dioxide";
T = 350
P = 1:40;
```

```
Tcrit = criticalValues{criticalValues.Gas == lower(gas), 'CriticalTempK'};
Pcrit = criticalValues{criticalValues.Gas == lower(gas), 'CriticalPressBar'};

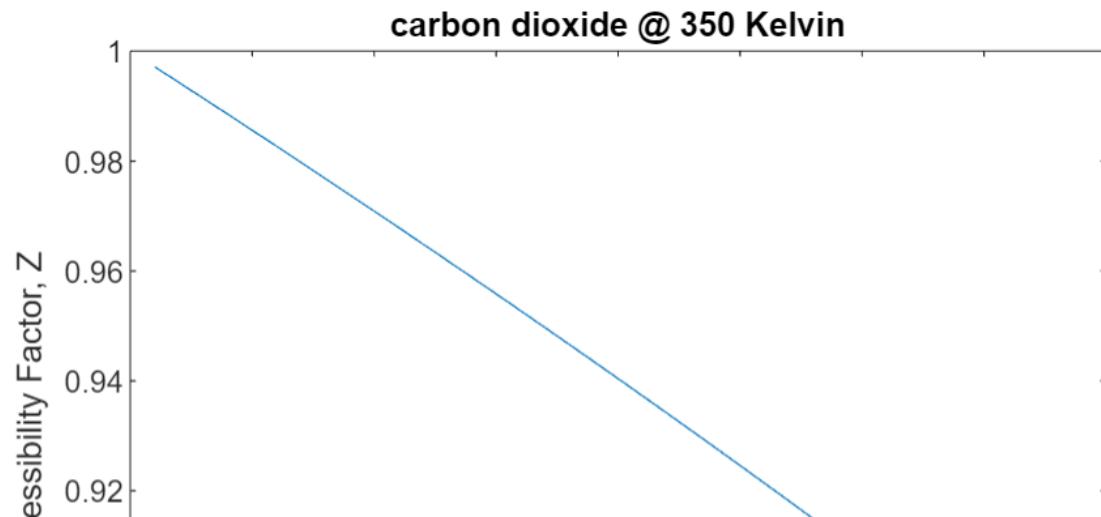
Z = compressibilityFactor(Tcrit, P, T, Pcrit);

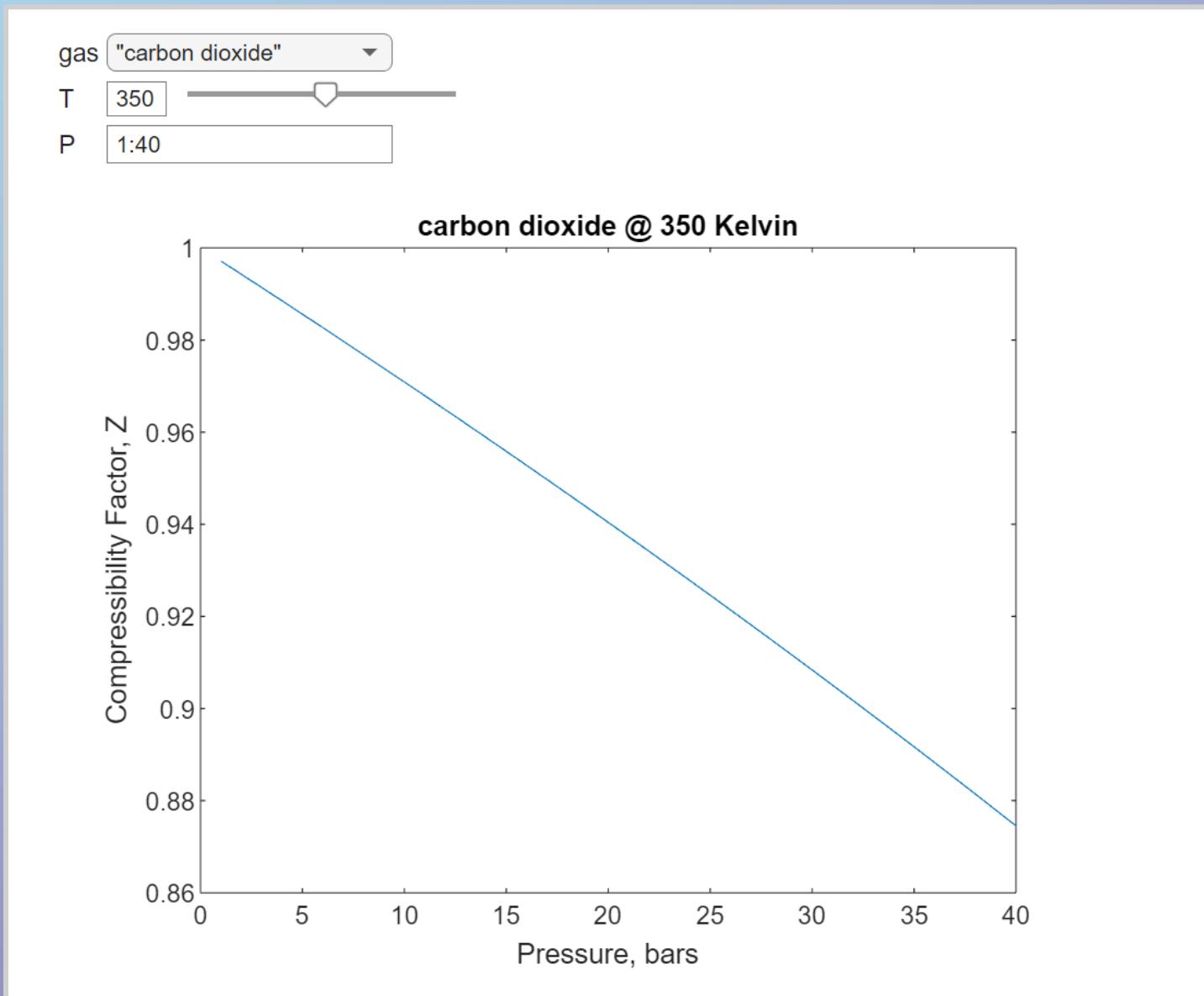
plot(P,Z)
xlabel('Pressure, bars');
ylabel('Compressibility Factor, Z');
title(strcat(gas," @ ",num2str(T)," Kelvin"));
```



```
gas = "carbon dioxide" ;
```

```
Tcrit = criticalValues{criticalValues.Gas == lower(gas), 'CriticalTempK'};  
Pcrit = criticalValues{criticalValues.Gas == lower(gas), 'CriticalPressBar'};  
  
Z = compressibilityFactor(Tcrit, P, T, Pcrit);  
  
plot(P,Z)  
xlabel('Pressure, bars');  
ylabel('Compressibility Factor, Z');  
title(strcat(gas," @ ",num2str(T)," Kelvin"));
```







Generate polynomials

X Minimum:

X Maximum:

X Step:

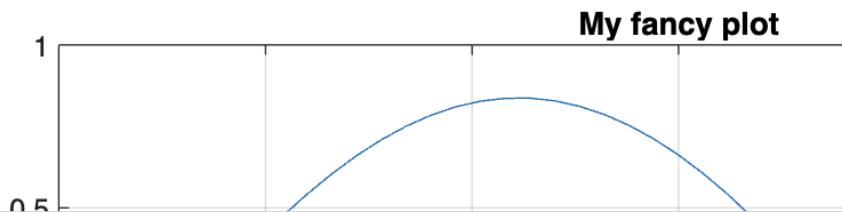
Degree:

Alpha:

Polynomial:

Hold

Title





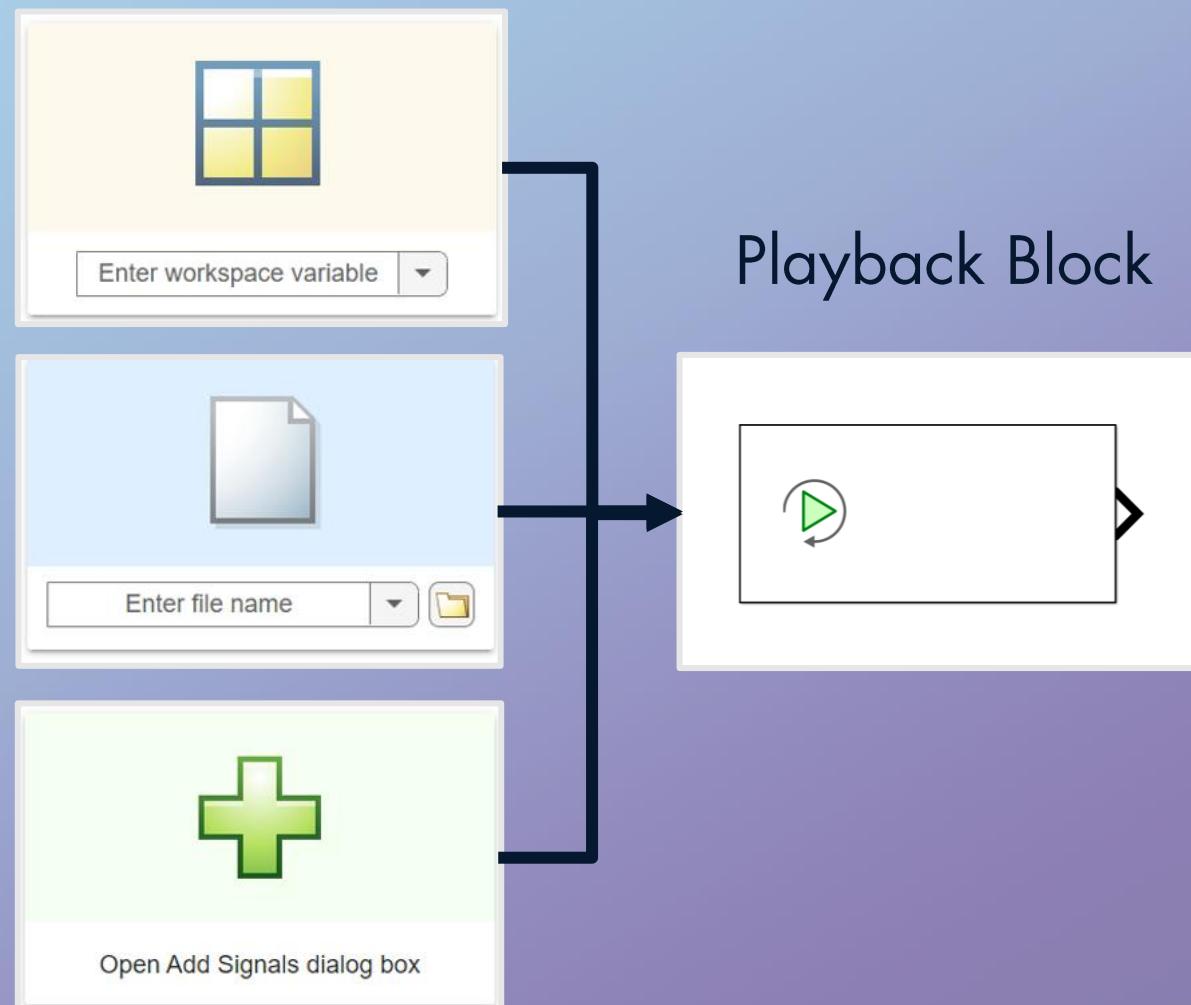
Import Patient Data

filename =



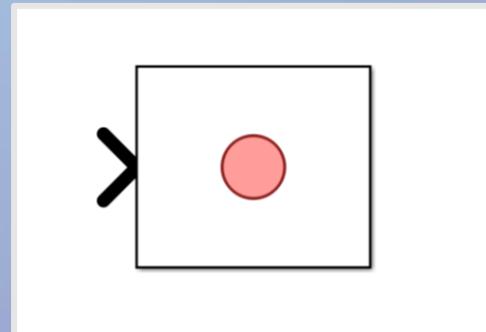
Select File



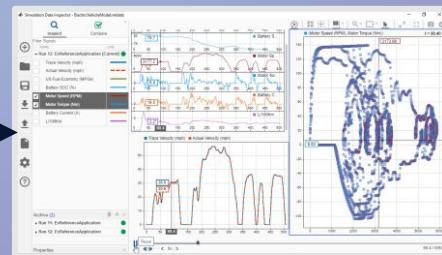




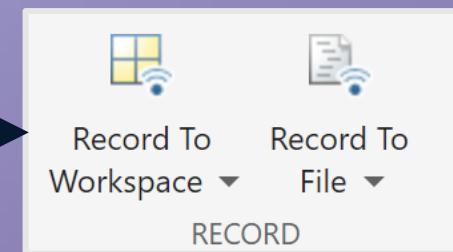
Record Block



Visualize



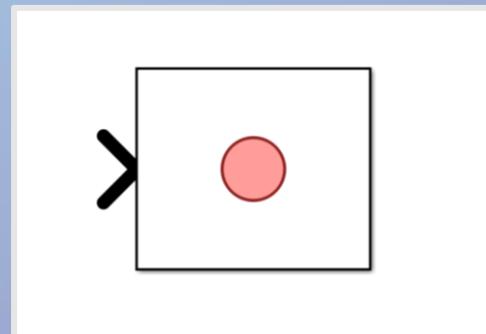
Log





Fast and repeatable tests

Record Block

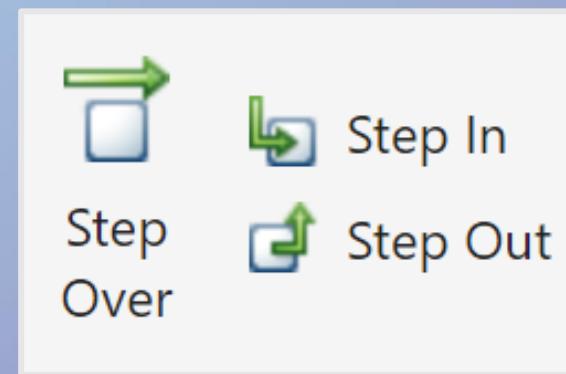


Playback Block



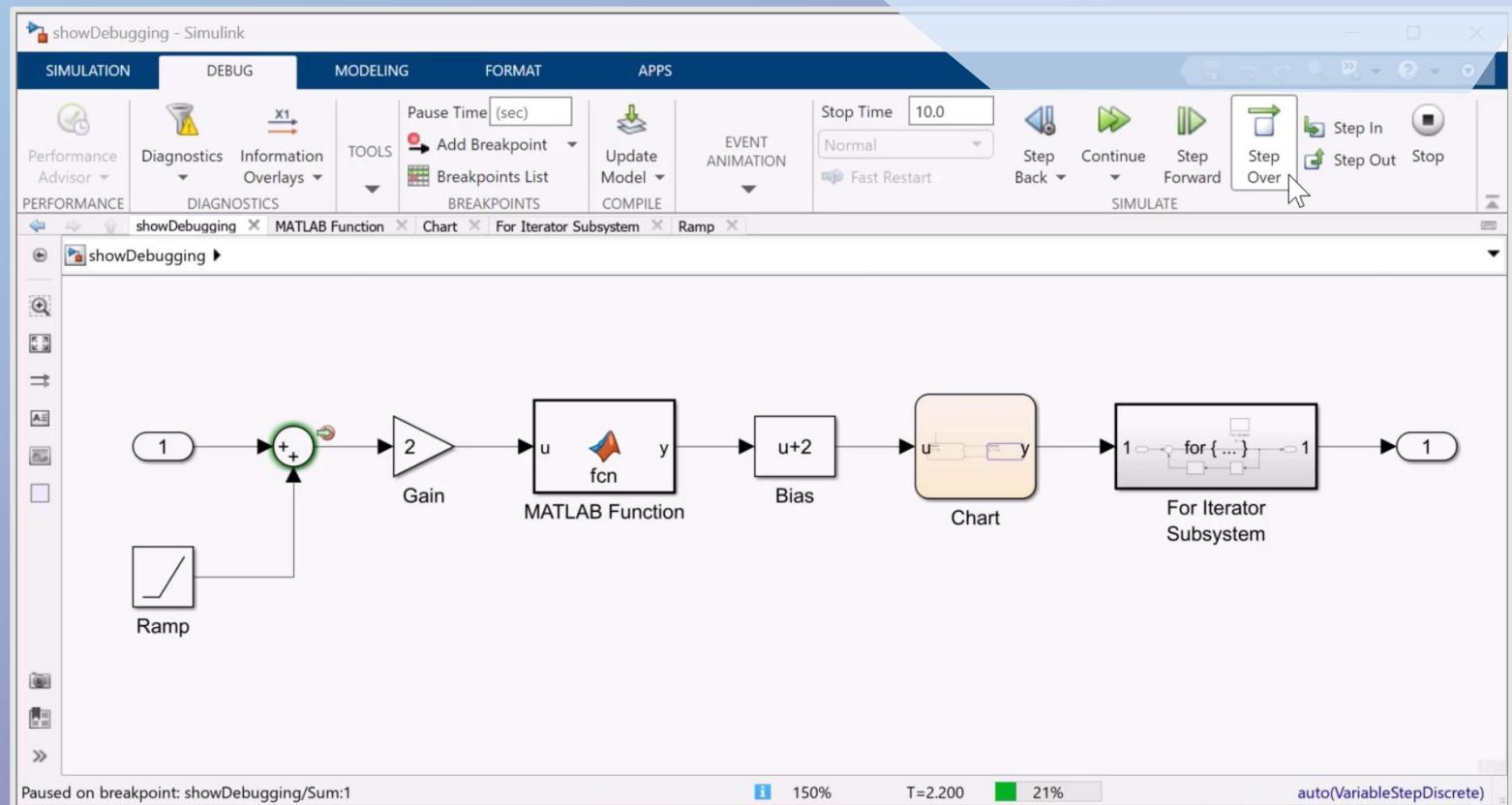
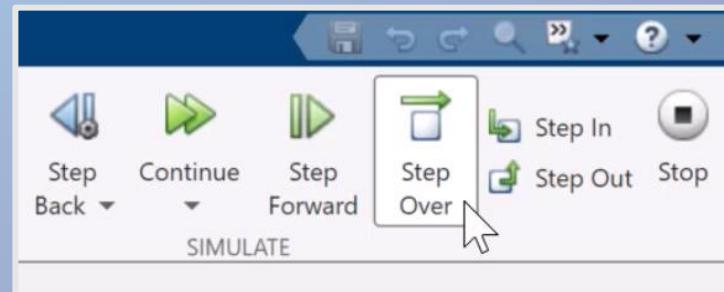
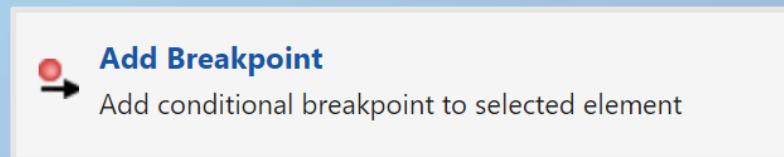


Step through a Simulation





Ease of Use





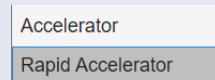
Improve Performance of Simulations



Model Referencing



Fast Restart



Accelerator Modes



Simulink Cache



Performance Advisor



Multi-Core Co-Simulation

SIMD

Hardware Acceleration



Performance Advisor

1 Baseline ✓1 ✗0 ⚠0 ⌂0

Create baseline
Passed Baseline generated successfully. Simulation took 00:00:00.580 seconds.

Input Parameters Selection

Name	Value
Stop Time	10
Check to view baseline signals and set their tolerances.	false

2 Simulation ✓2 ✗0 ⚠2 ⌂8

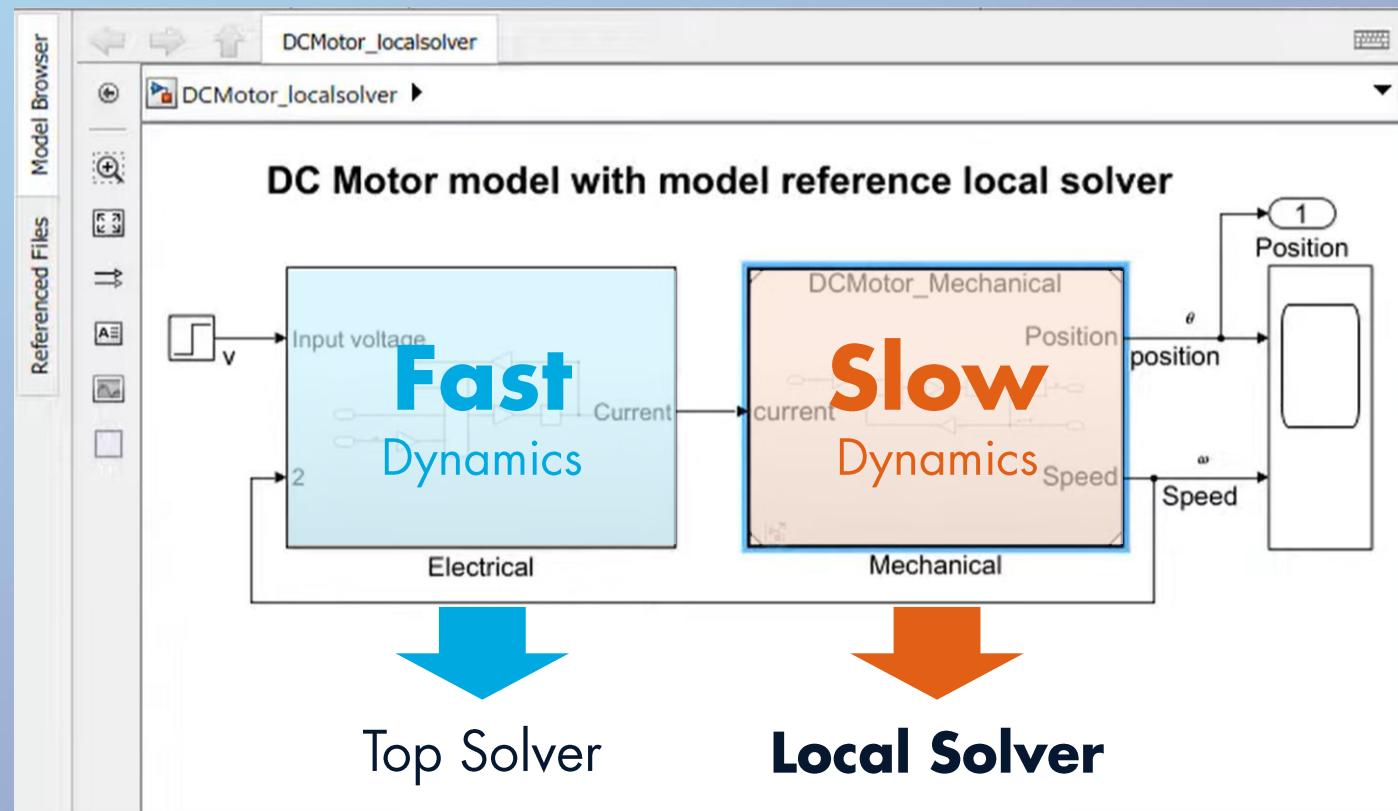
2.1 Checks Occurring Before Update ✓1 ✗0 ⚠2 ⌂6

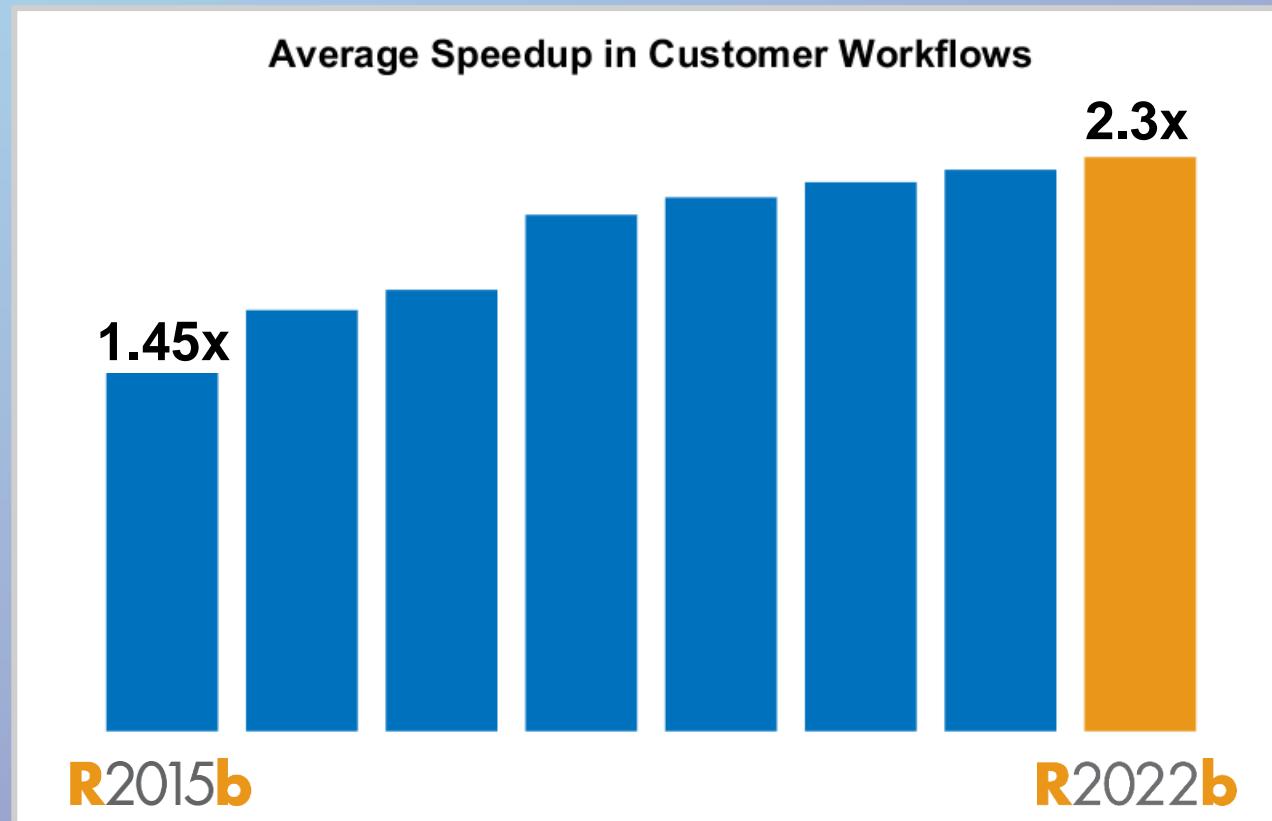
Identify resource-intensive diagnostic settings

Some diagnostics incur run-time overhead during simulation. Review the following parameters for these parameters.

Click link(s) to make changes manually. Alternatively, click the 'Modify all' button below to

	Severity	Diagnostics checked
Solver	✓	Diagnostics > Solver data inconsistency
Signals	⚠	Diagnostics > Data Validity > Signal resolution
	✓	Diagnostics > Data Validity > Division by singular matrix
	✓	Diagnostics > Data Validity > Inf or nan block output
	✓	Diagnostics > Data Validity > Simulation range checking
	✓	Diagnostics > Data Validity > Array bounds exceeded
DSM Blocks	⚠	Diagnostics > Data Validity > Detect read before write
	⚠	Diagnostics > Data Validity > Detect write after read







Functions

1.6x

Function handles

40x

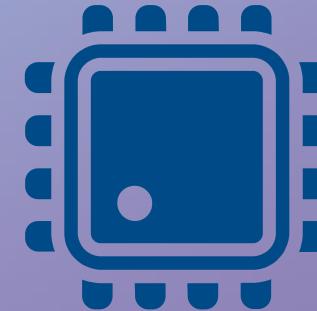


Ease of Use

**Software
Development**

Integration





Code Analyzer

The Code Analyzer identifies and addresses code issues, including problems and areas for improvement.

Overall Summary

11

total files



0

Error



8

Warning



4

Info

Select Folder

/Users/mhirsch/Library/CloudStorage/OneDrive-MathWorks/mfiles/Demos/TwitterAnalysis

Rerun Analysis

Group by Severity

Filter by Severity

Filter by Issue Type

Code Health Details

Analysis Date: 3/31/2023, 5:28:42 PM

Warning (8)

- ▶ Input argument might be unused. Consider replacing the argument with ~ instead. (3)
- ▶ To avoid conflicts with functions on the path, specify variables to load from file. (3)
- ▶ Variable might be used before it is defined. (1)
- ▶ Value assigned to variable might be unused. (1)

Info (4)

- ▼ Add a semicolon after the statement to hide the output (in a script). (3)

Fix All

[Line 3](#) Script1_ImportTwitterData.m c twitter(c.ConsumerKey,c.ConsumerSecret,c.AccessToken,c.AccessToker

Fix

[Line 14](#) Script1_ImportTwitterData.m statuses [statuses;sRefresh.Body.Data.statuses]

Fix

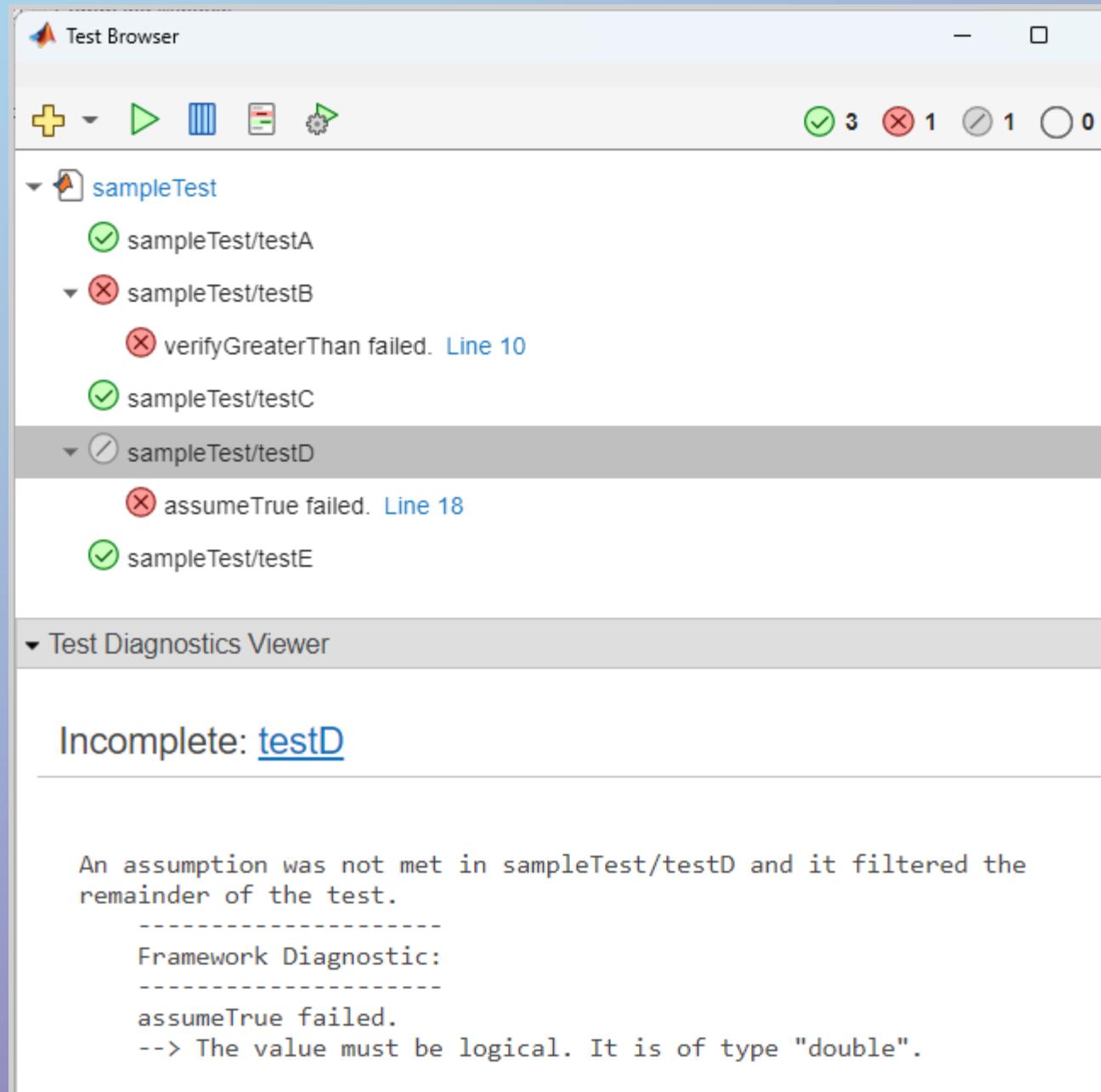
[Line 47](#) Script1_ImportTwitterData.m tweets timetable(tweetTexts,'RowTimes', datetime(tweetTimes,'Format'

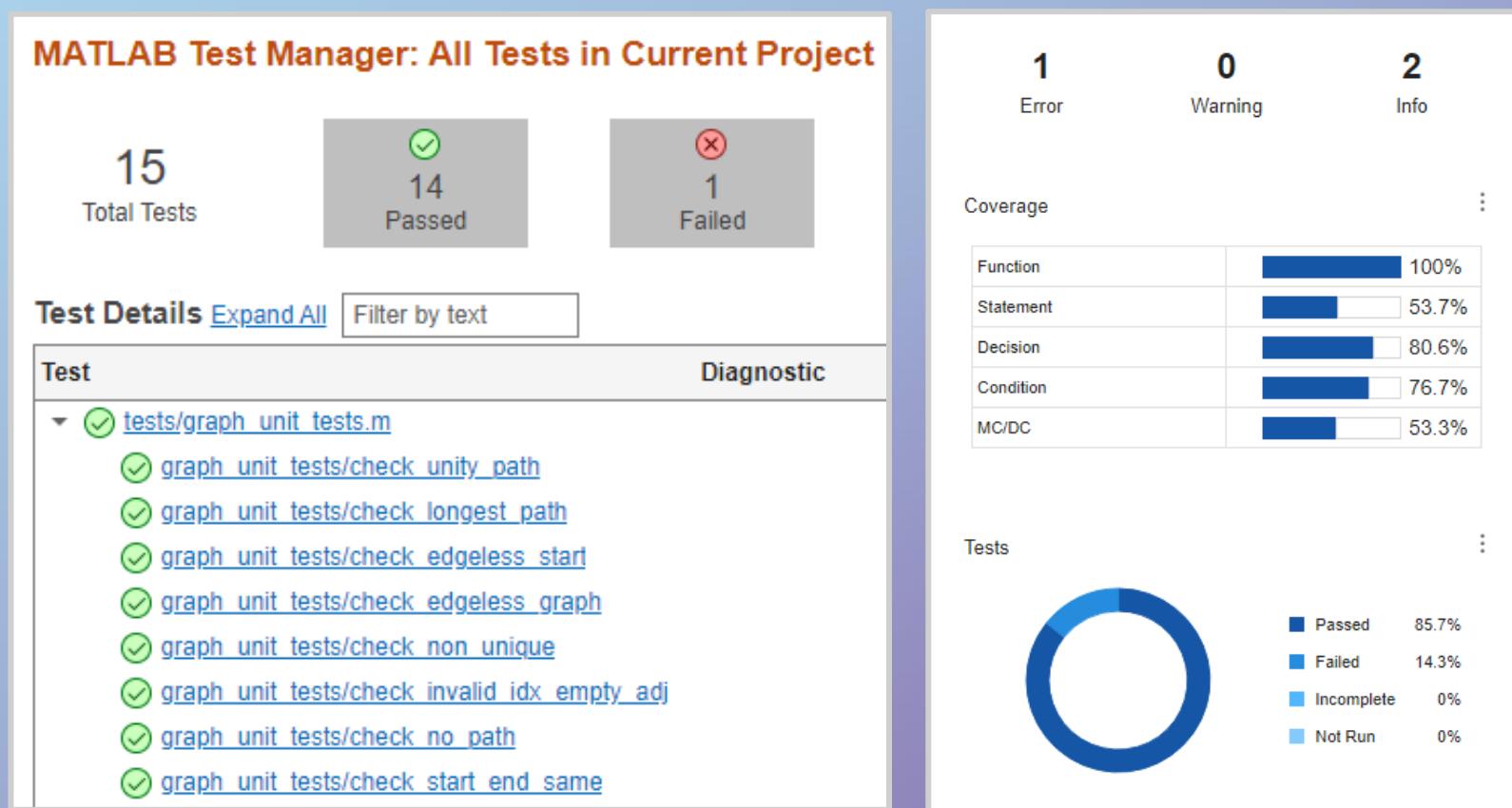
Fix

	Fix All
ccessToken, c.AccessToker	Fix
es]	Fix
time(tweetTimes, 'Format'	Fix

```
2
3 evalin("base","newvar = " + x)
4
```

! Flight Analysis Team standards prohibit use of evalin.





MATLAB Test

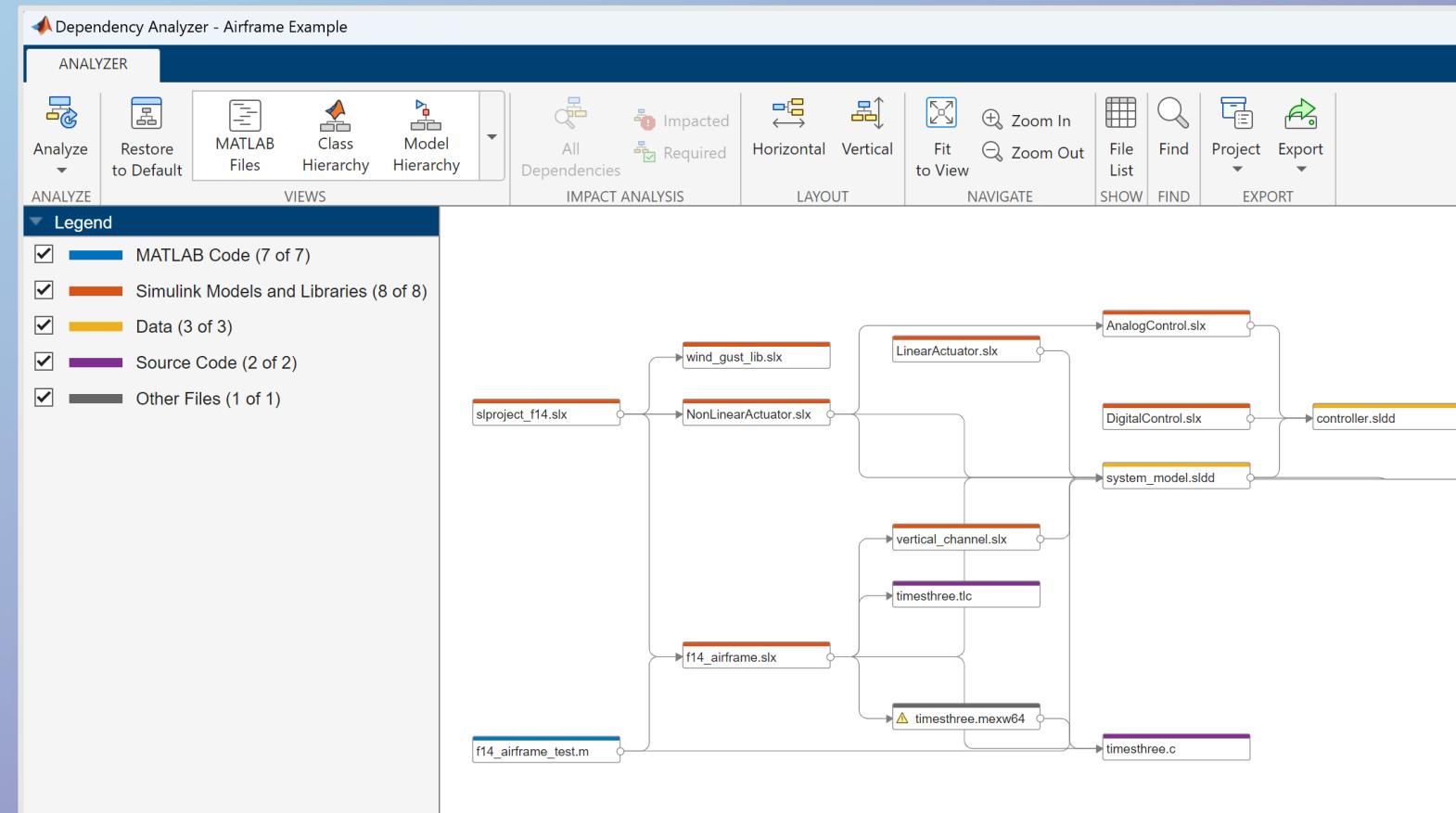
```
>> buildtool -tasks
check    - Identify code issues
test     - Run unit tests
Toolbox  - Package Toolbox

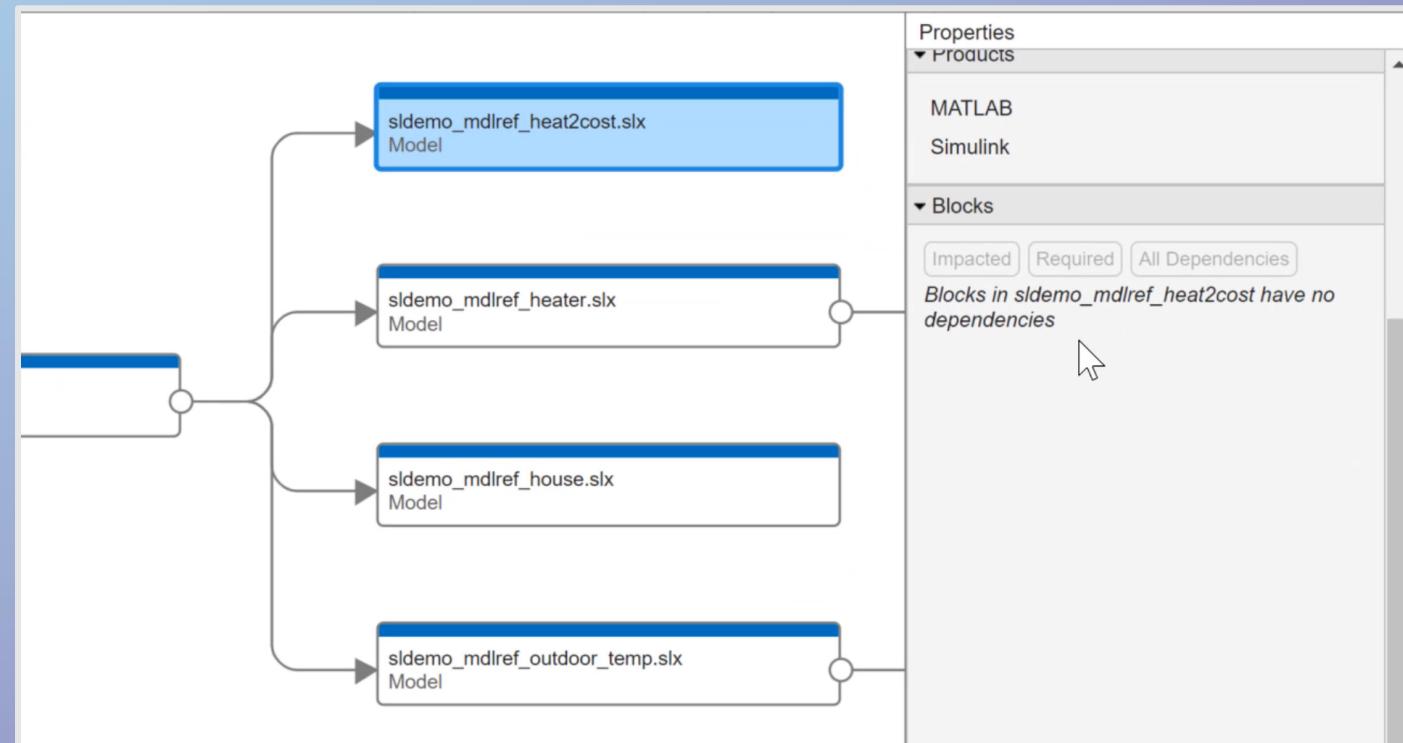
>> buildtool
** Starting check
** Finished check

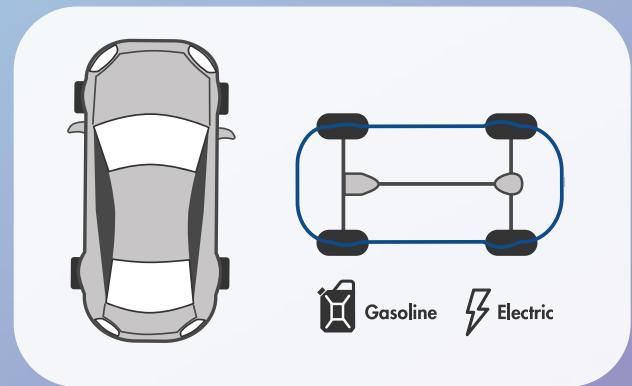
** Starting test
** Finished test

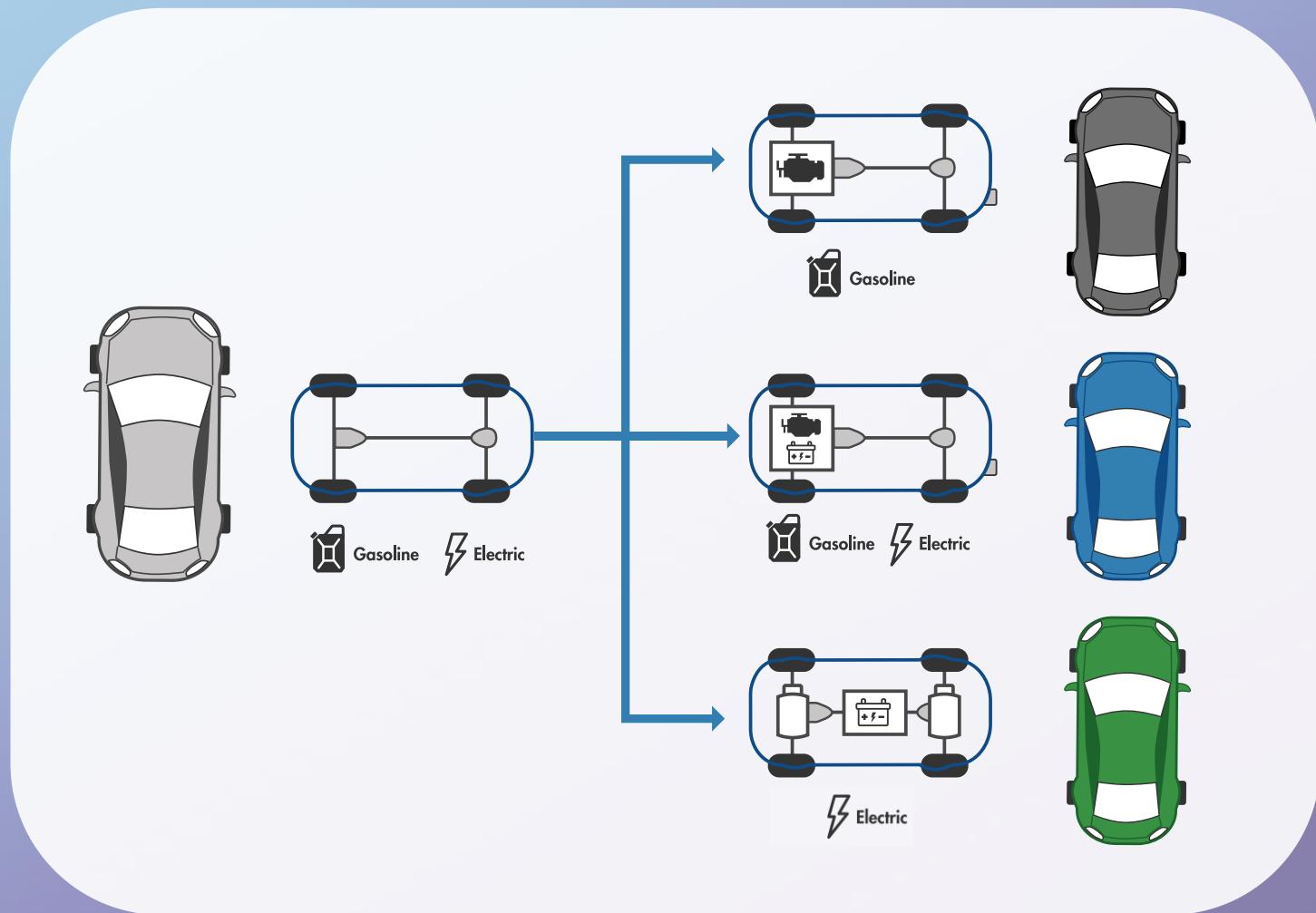
** Starting toolbox
** Finished toolbox
>>
```

Projects









变体配置管理器支持包

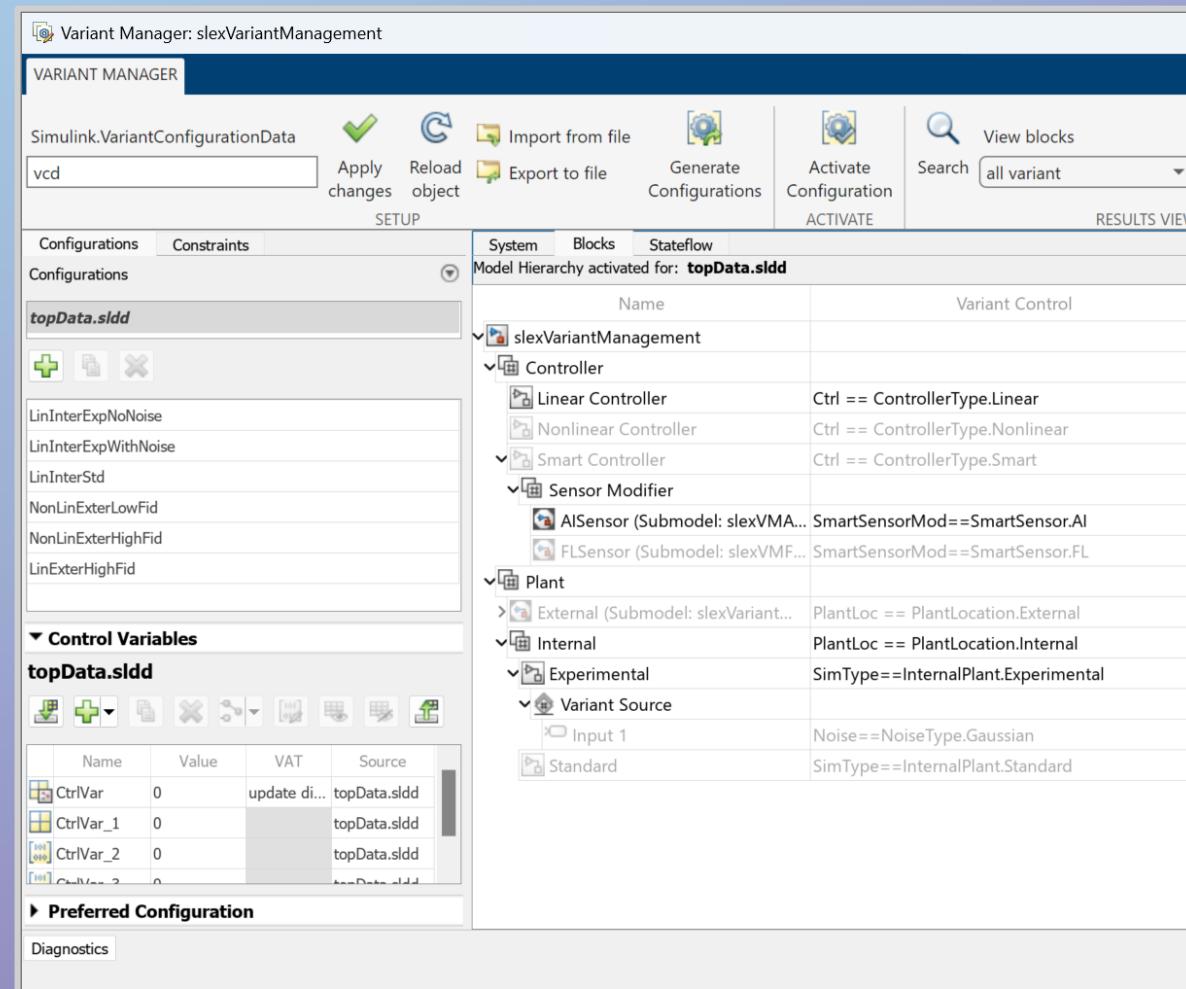
Variant Manager Support Package

Variant Manager Support Package

Manage

Analyze

Reduce





Variant Manager Support Package

Manage

Analyze

Reduce

The screenshot shows the Variant Configuration Analysis tool window. At the top, there are search and view options: 'Search Blocks' (set to 'Search Block'), 'View Blocks' (set to 'All Blocks'), and filter checkboxes for 'Always Active', 'Partially Active', and 'Never Active'. The main area is a table showing variant configurations across different model components. The columns represent variant types: LinInterExpN..., LinInterExpW..., LinInterStd, NonLinExter..., and NonLinExterL... (partially visible). The rows show components like 'slexVariantManagement', 'Controller', 'sensor', 'Linear Controller', 'Nonlinear Controller', 'Smart Controller', and 'Sensor Modifier'. Some rows are expanded to show specific variants. The bottom section is an 'ANNOTATION' table with columns 'Annotation' and 'Condition', listing various configuration conditions.

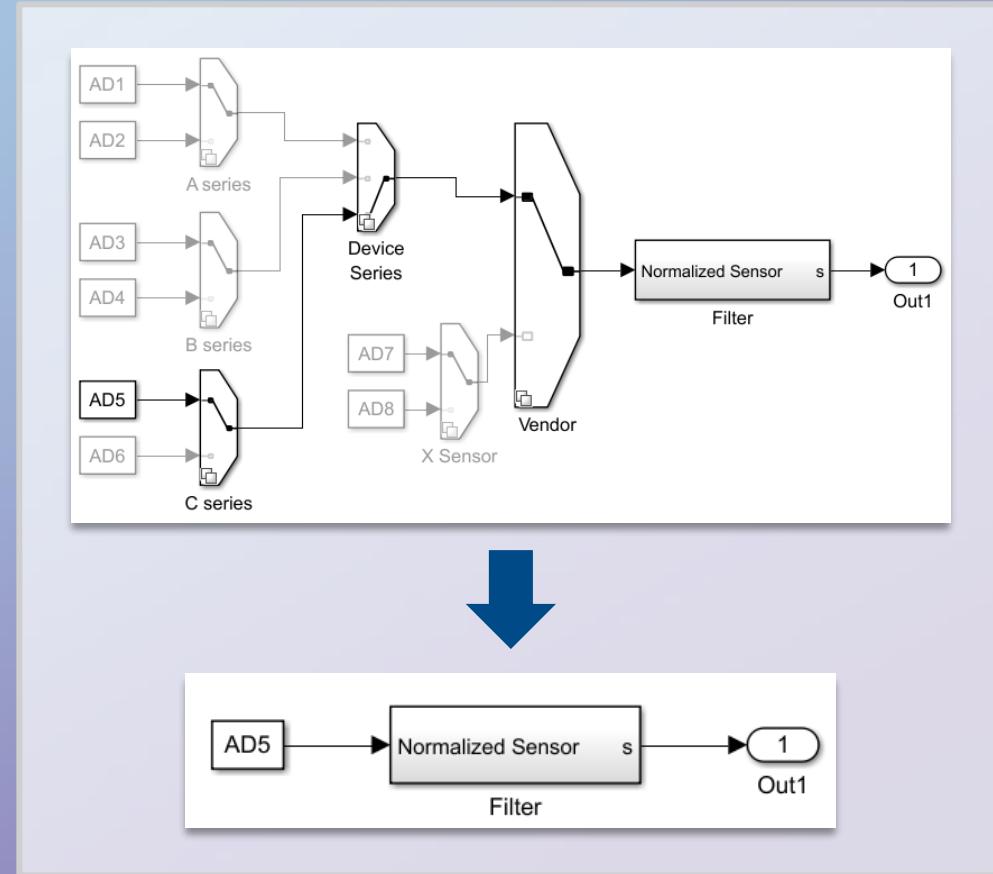
Annotation	Condition
c:3	Ctrl == ControllerType.Linear
c:4	Ctrl == ControllerType.Nonlinear
c:5	Ctrl == ControllerType.Smart
c:1	FidType == Fidelity.High
c:2	FidType == Fidelity.Low
c:11	Noise == NoiseType.Gaussian
c:8	PlantLoc == PlantLocation.External
c:9	PlantLoc == PlantLocation.Internal

Variant Manager Support Package

Manage

Analyze

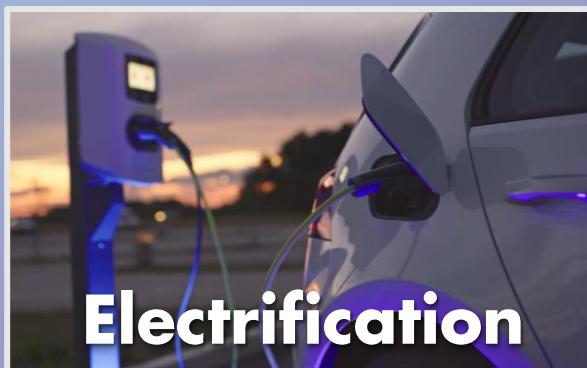
Reduce





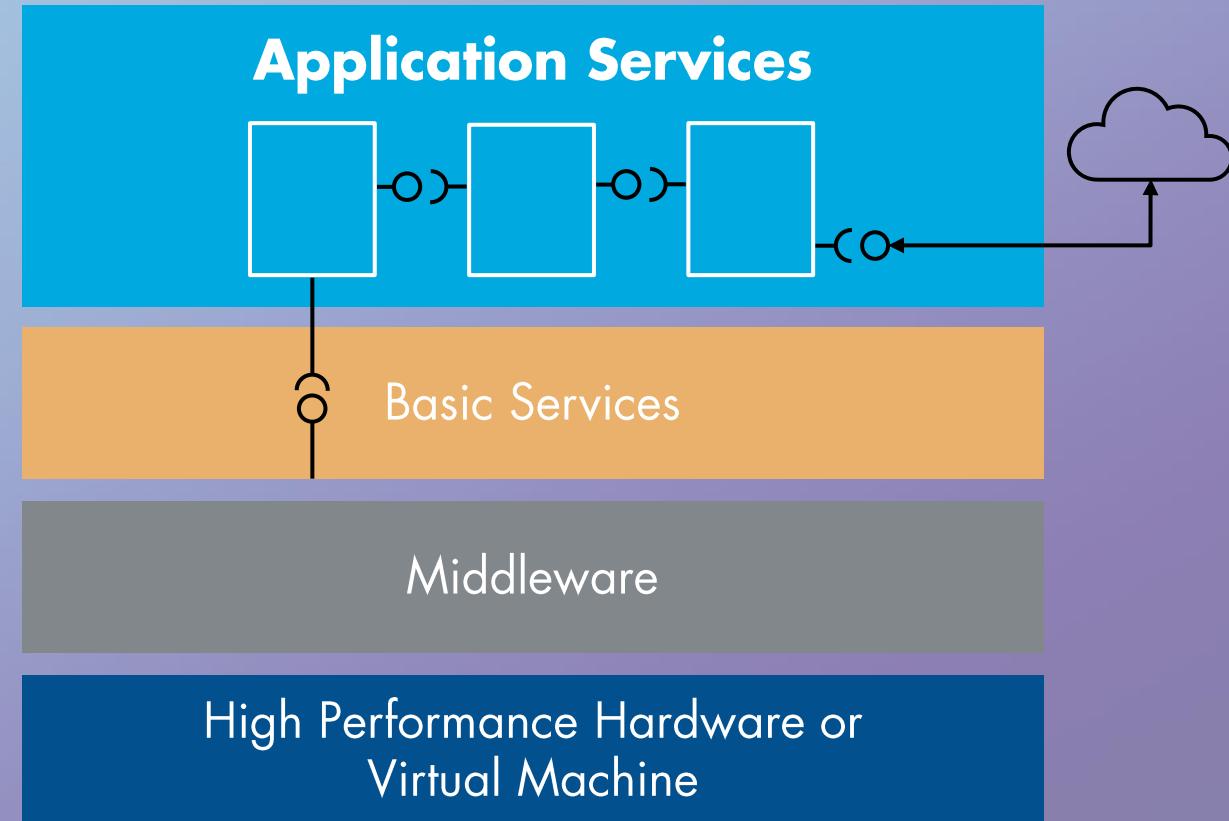
Software Development



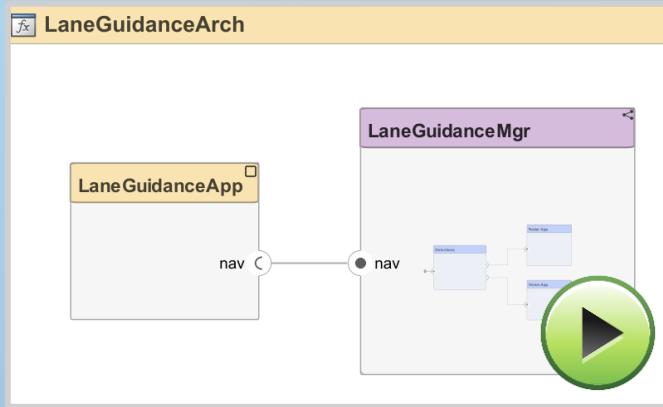


Software-Defined Vehicle

Service-Oriented Architecture (SOA)



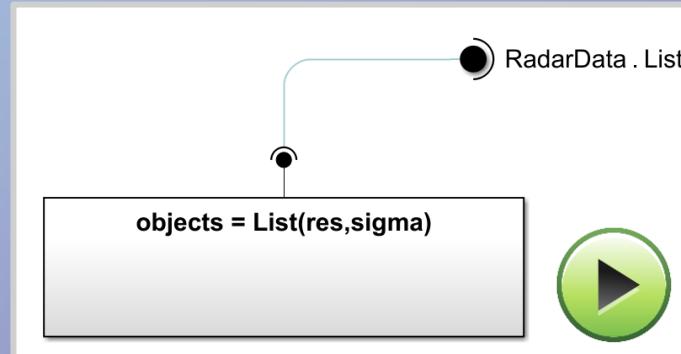
From **architecture** to **design**



Describe Architecture



From **design** to **code**



Implement Design



```

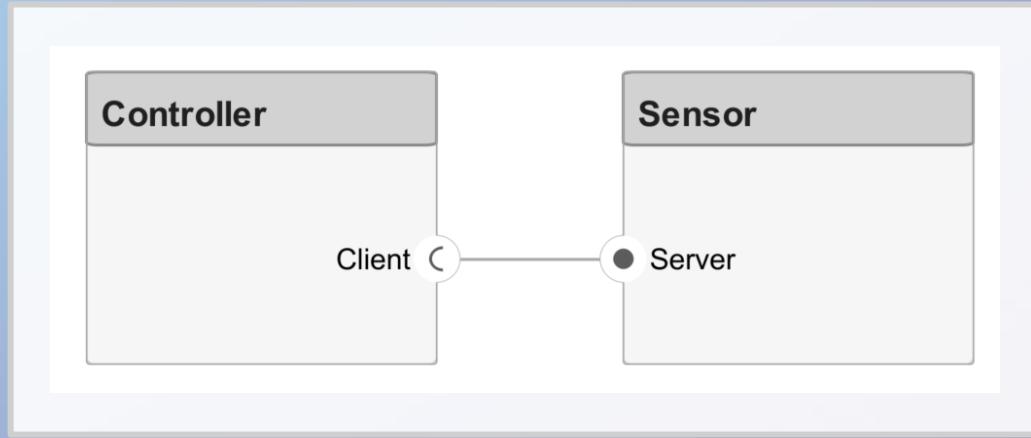
36   class scServiceInterfaceExample final
37   {
38       // public data and function members
39   public:
40       // Block signals (default storage)
41       struct B_scServiceInterfaceExample_T {
42           real_T fetchData_b;
43           real_T reset_d;
44           real_T fetchData_m;
45           real_T reset_p;
46       };
47   }
  
```



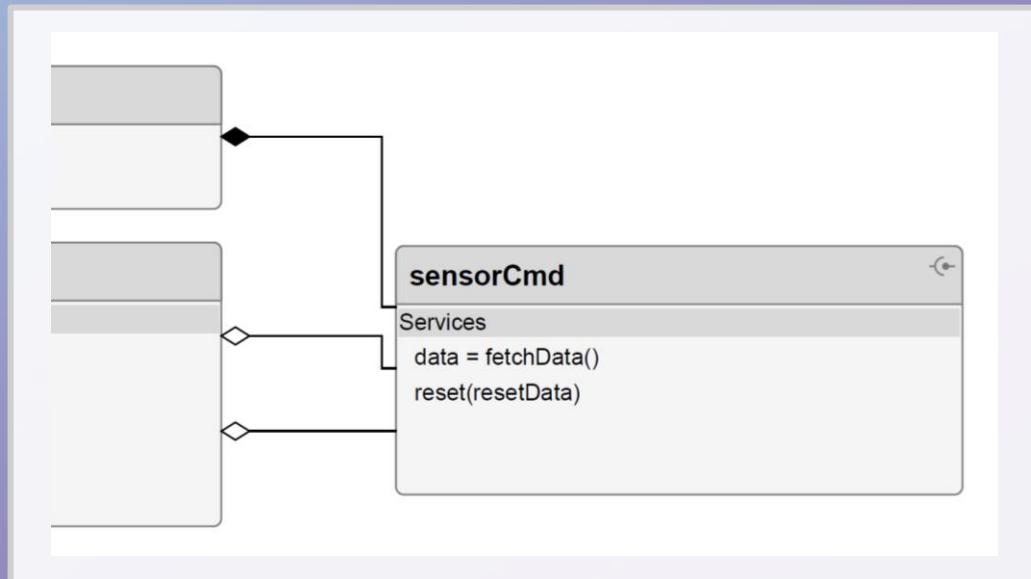
Generate C++ Code

Describe Architecture

Define



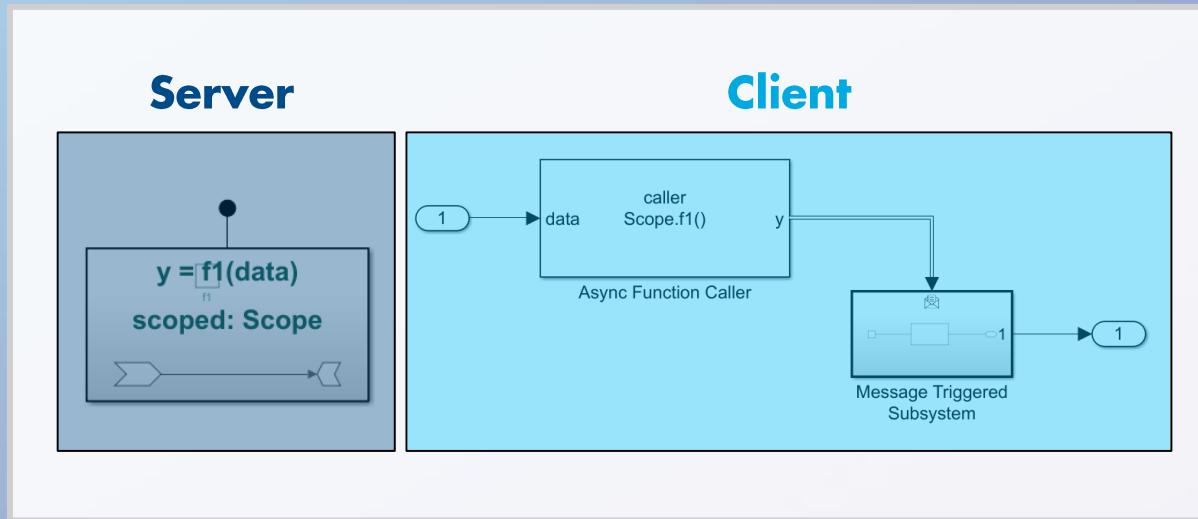
Visualize



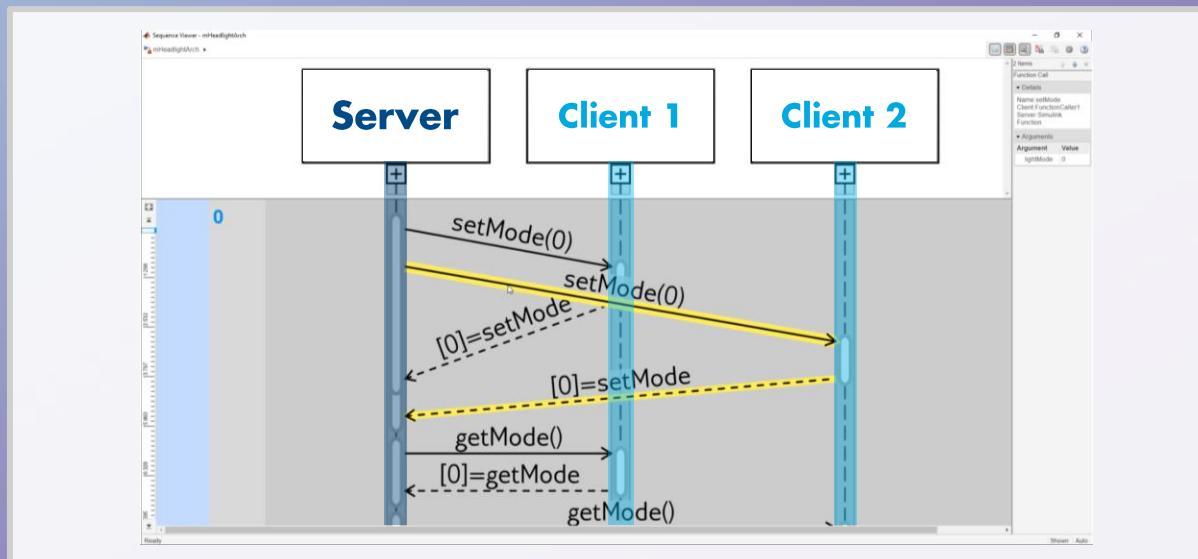


Implement Design

Model

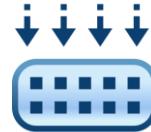


Simulate



Generate Code

```
36  class scServiceInterfaceExample final
37 {  
38     // public data and function members  
39     public:  
40     // Block signals (default storage)  
41     struct B_scServiceInterfaceExample_T {  
42         real_T fetchData_b;           // '<Root>/Sensor1'  
43         real_T reset_d;             // '<Root>/Sensor1'  
44         real_T fetchData_m;          // '<Root>/Sensor2'  
45         real_T reset_p;             // '<Root>/Sensor2'  
46     };
```

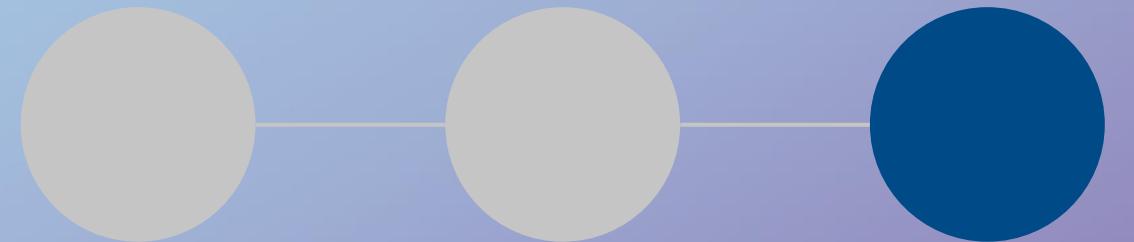


AUTOSAR



ROS

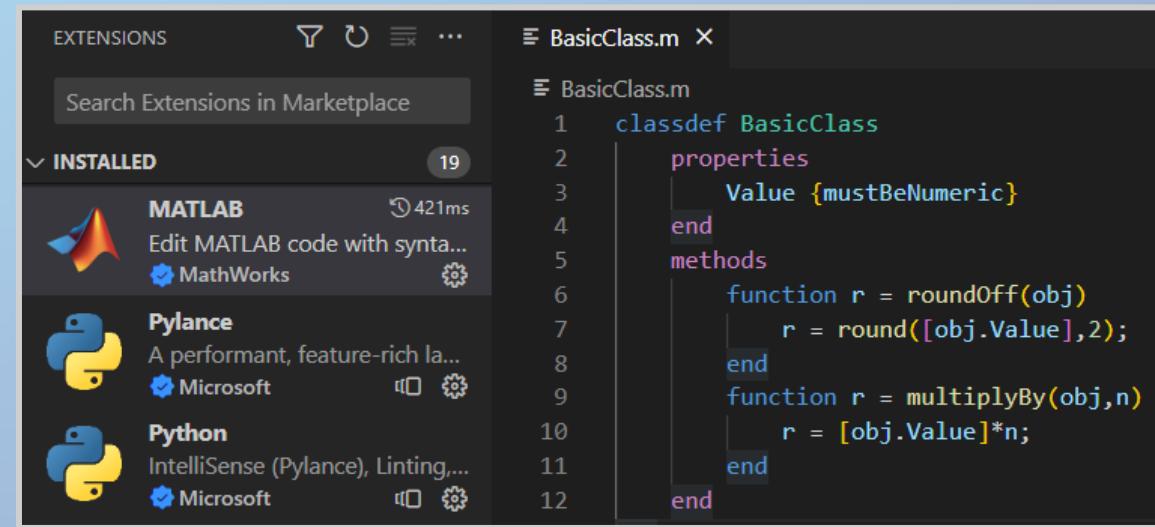




Ease of Use

**Software
Development**

Integration



EXTENSIONS

Search Extensions in Marketplace

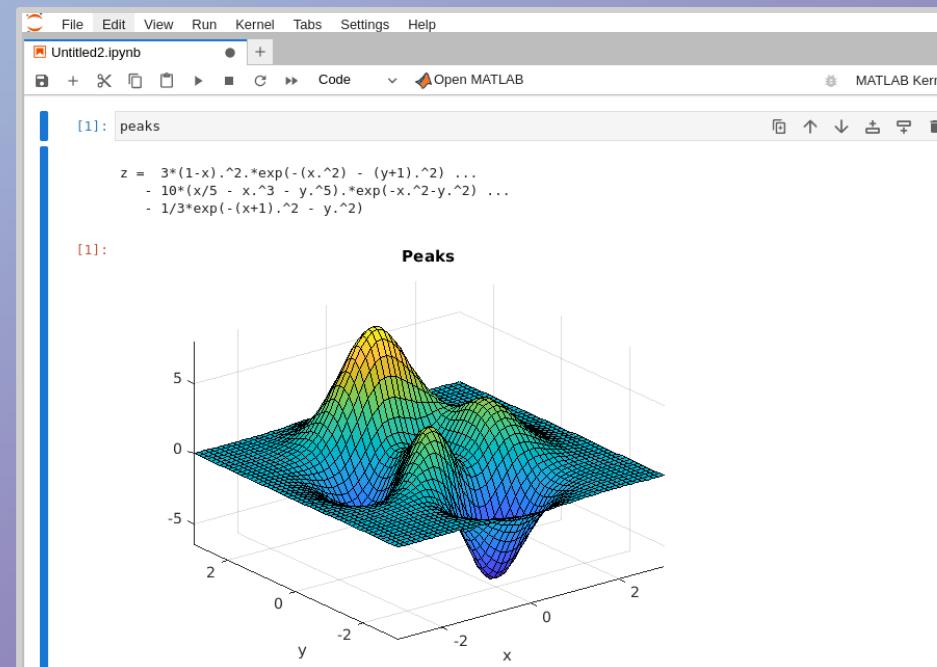
INSTALLED

- MATLAB Edit MATLAB code with syntax... MathWorks
- Pylance A performant, feature-rich language server Microsoft
- Python IntelliSense (Pylance), Linting, and Refactoring Microsoft

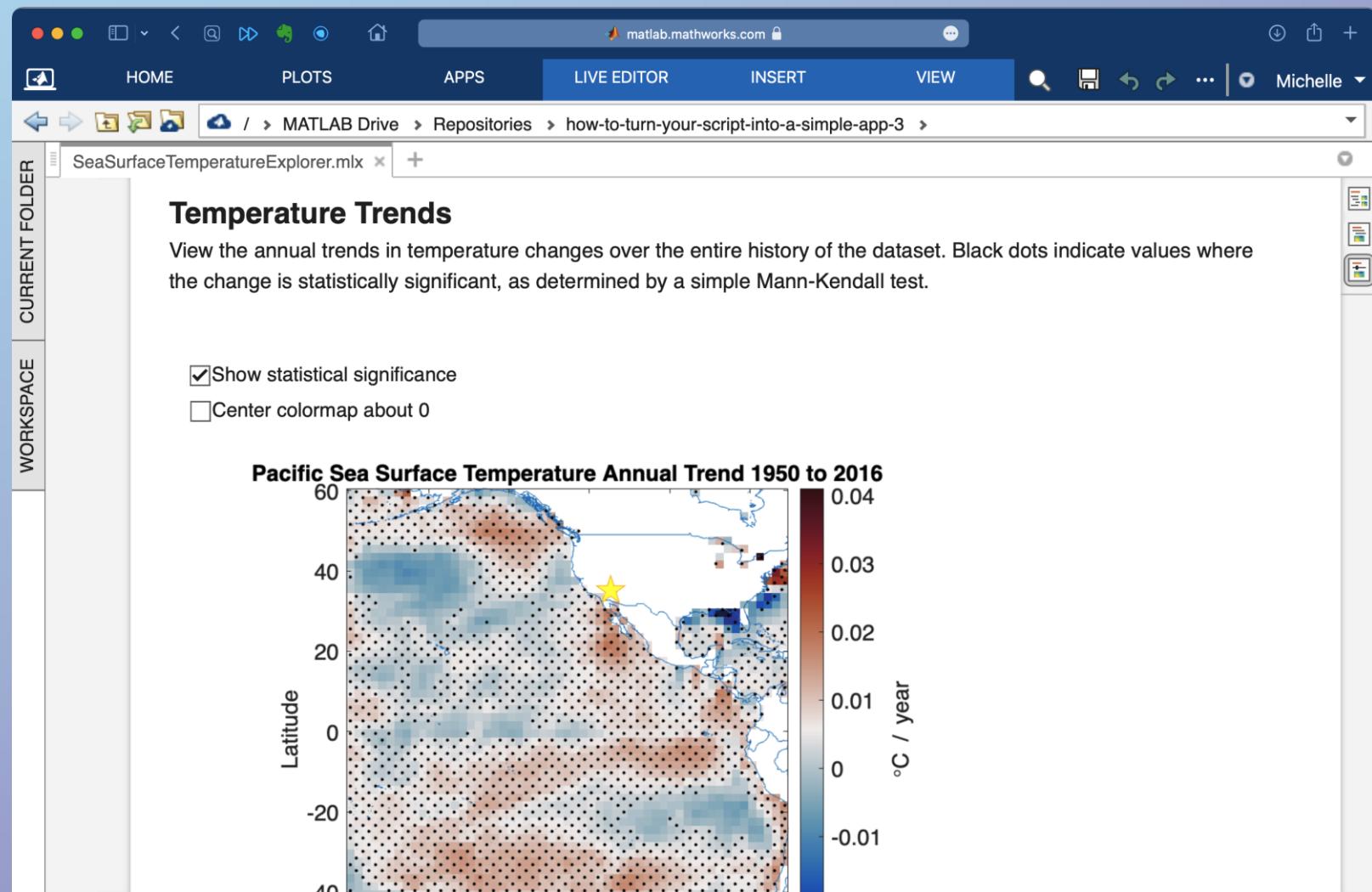
BasicClass.m

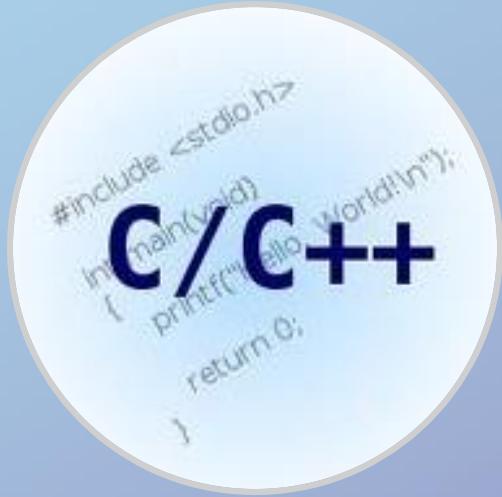
```
1 classdef BasicClass
2     properties
3         Value {mustBeNumeric}
4     end
5     methods
6         function r = roundOff(obj)
7             r = round([obj.Value],2);
8         end
9         function r = multiplyBy(obj,n)
10            r = [obj.Value]*n;
11        end
12    end
```

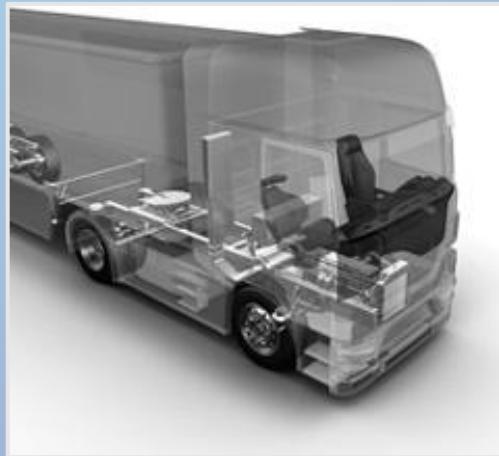
Visual Studio Code



Jupyter







R2017b

FMU
Import

FMU Import

R2018b

<FunctionName>

C Caller

R2020a

C

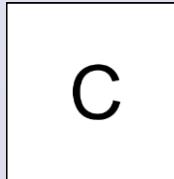
C Function

R2021a



Code Importer

R2022a

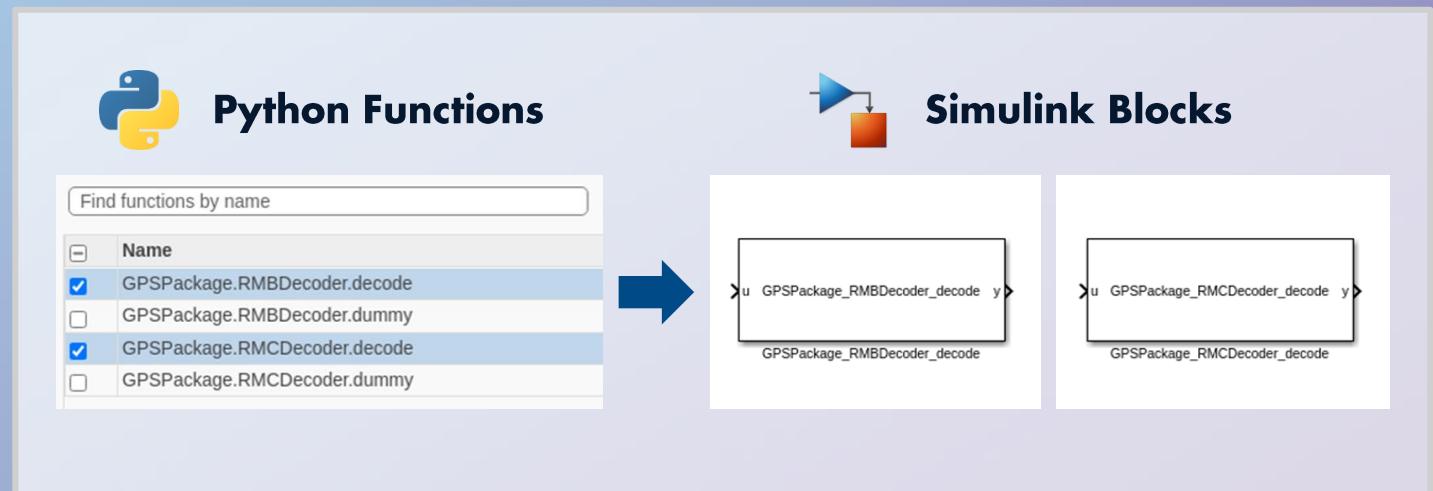


C Function
Supports C++

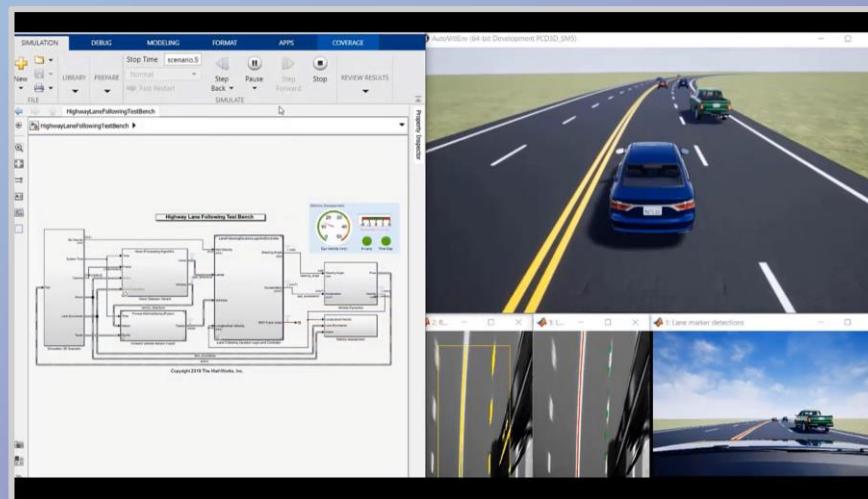
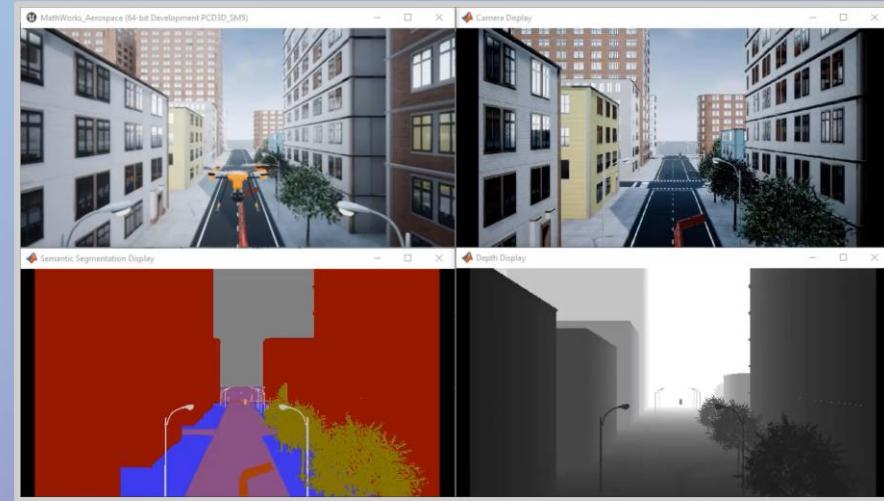
R2023a



Python Importer



3D Visualizations





The MATLAB Blog

Practical Advice for People on the Leading Edge



Guy on Simulink

Simulink & Model-Based Design

<https://blogs.mathworks.com>

MATLAB EXPO



AI



Algorithm Development
and Data Analysis



Autonomous Systems and
Robotics



Cloud, Enterprise, and
DevOps



Electrification



Modeling, Simulation,
and Implementation



Preparing Future Engineers
and Scientists



Wireless Connectivity
and Radar

MATLAB EXPO

Thank you



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