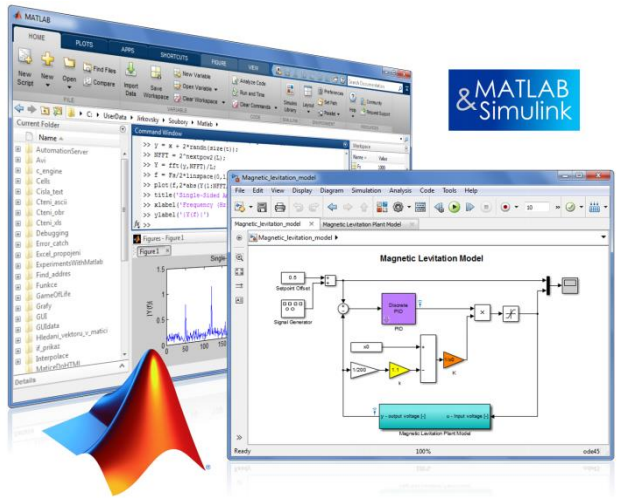
HUMUSOFT

TCC 2021

Novinky v prostredí MATLAB v roku 2021



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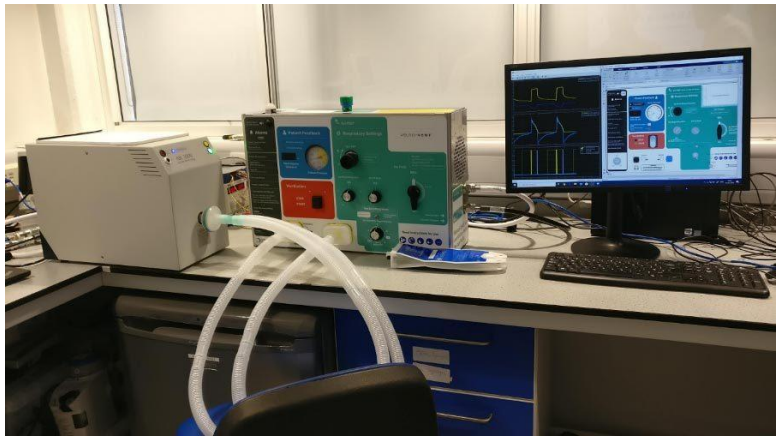
info@humusoft.cz

www.mathworks.com

Výskum a vývoj COVID-19

Ventilátory



[An Intensive Push to Make Ventilators for the COVID-19 Pandemic]

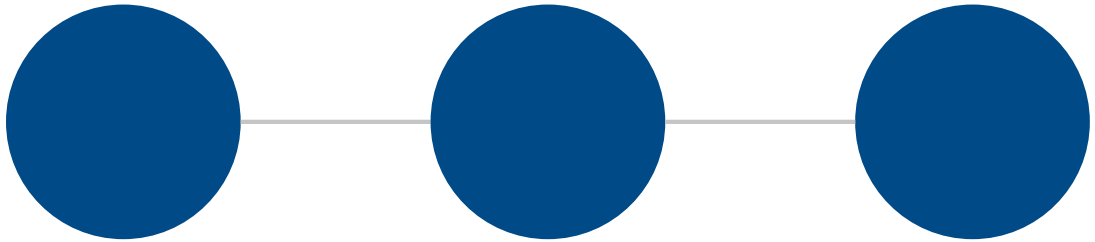
Dezinfekcia

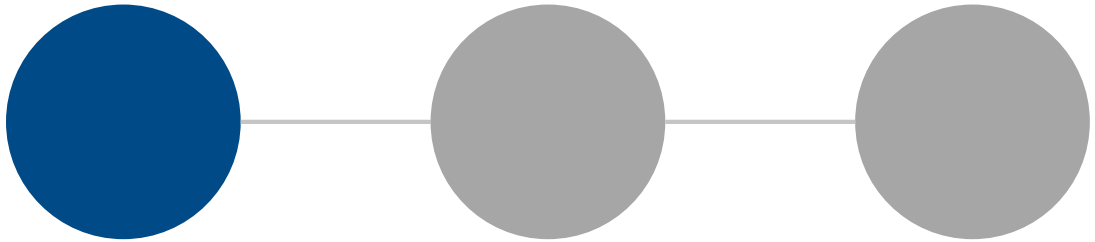
[A 10-Day Dash to Build Robots That Fight COVID-19]

Výučba

[Professor Reengineers MATLAB Course Overnight in Response to COVID-19]

[COVID-19 Research and Development with MATLAB and Simulink]


Práca
Spolupráca
Produkcia


Práca
Spolupráca
Produkcia

Live Editor - C:\Demos\WeatherEventAnalysis\PreprocessData.mlx *

LIVE EDITOR | INSERT | VIEW

New | Open | Save | Compare | Print | Export | Go To | Find | Bookmark | Text | Normal | Code | Control | Task | Refactor | Run Section | Section Break | Run and Advance | Run to End | Run | Step | Stop

FILE | NAVIGATE | TEXT | CODE | SECTION | RUN

Demo_StormEventDataScience.mlx | AccessStormEventData.mlx * | PreprocessData.mlx *

Explore data

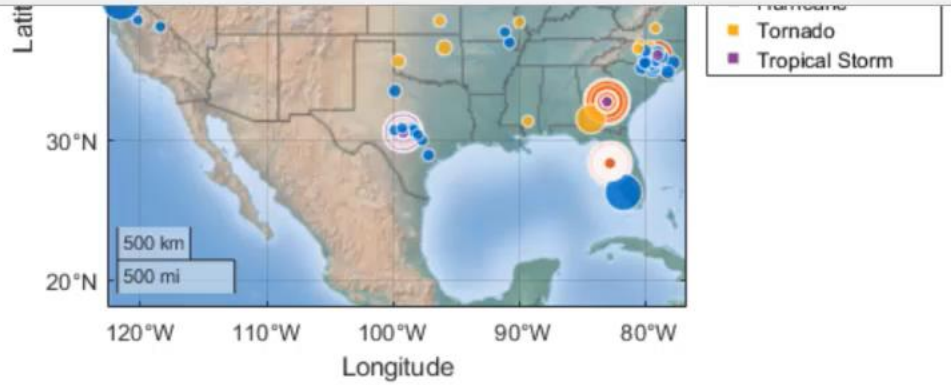
Plot some of the events on a map and use the size of the bubble as the damage cost.

```
threshold =   7640 ;
plotEventCostsMap(data,threshold);
```

Event frequency by location

Calculate damage costs by group.

```
damageByEvent = groupsummary(data,"weathercats",["mean","std"],"damage_total")
```

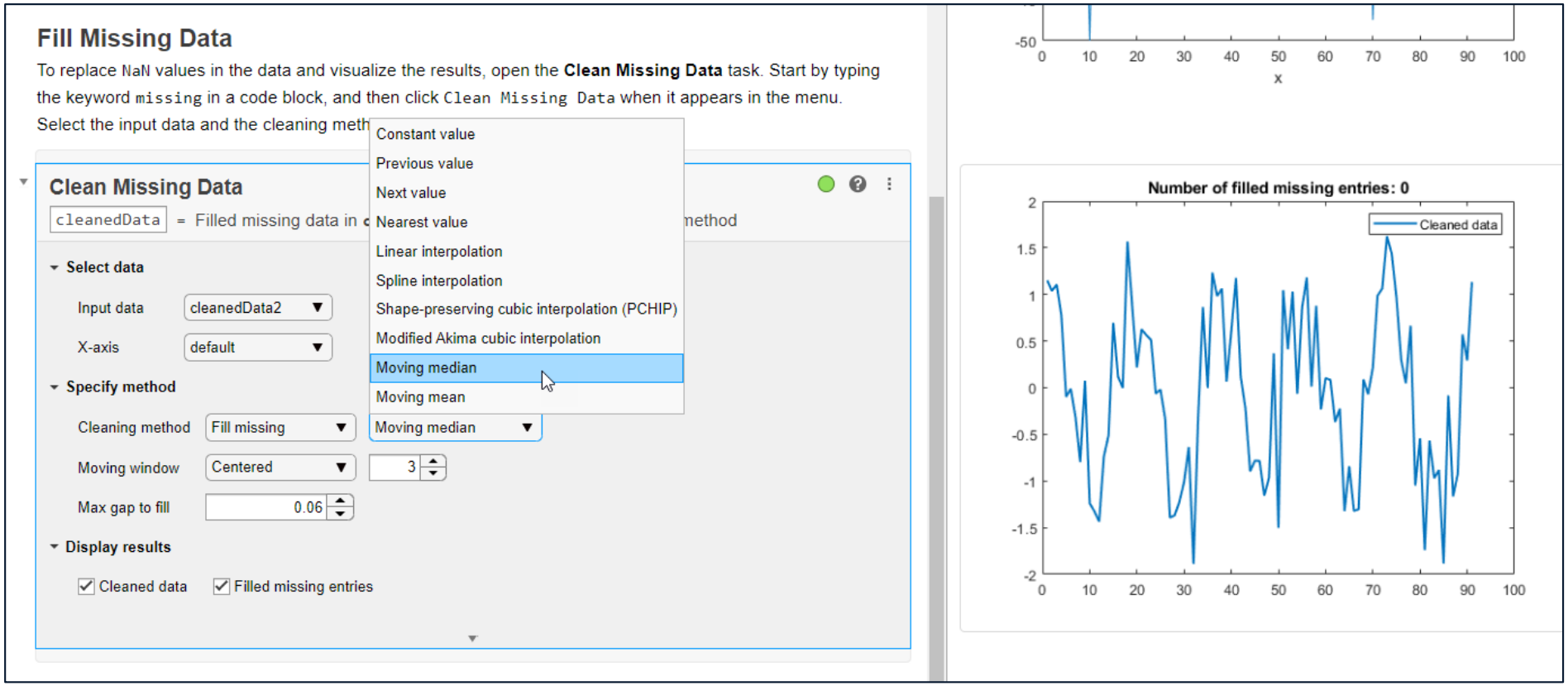


damageByEvent = 32×4 table

	weathercats	GroupCount	mean_damage_total	std_damage_total
1	Avalanche	39	1.2500	5.5160
2	Blizzard	961	4.8792	38.3841
3	Coastal Weather	6053	356.5849	1.1948e+04
4	Debris Flow	318	111.1654	736.8761
5	Dense Fog	1115	0.8292	9.3457
6	Dense Smoke	61	0	0
7	Drought	3584	0.1853	2.4966
8	Dust Devil	14	41.5714	132.2025
9	Dust Storm	151	8.8298	48.1969

UTF-8 | LF | script | Ln 25 | Col 1

Live Editor task



Live Editor - C:\Demos\CreatePlotExpo.mlx *

LIVE EDITOR INSERT VIEW

CreatePlotExpo.mlx *

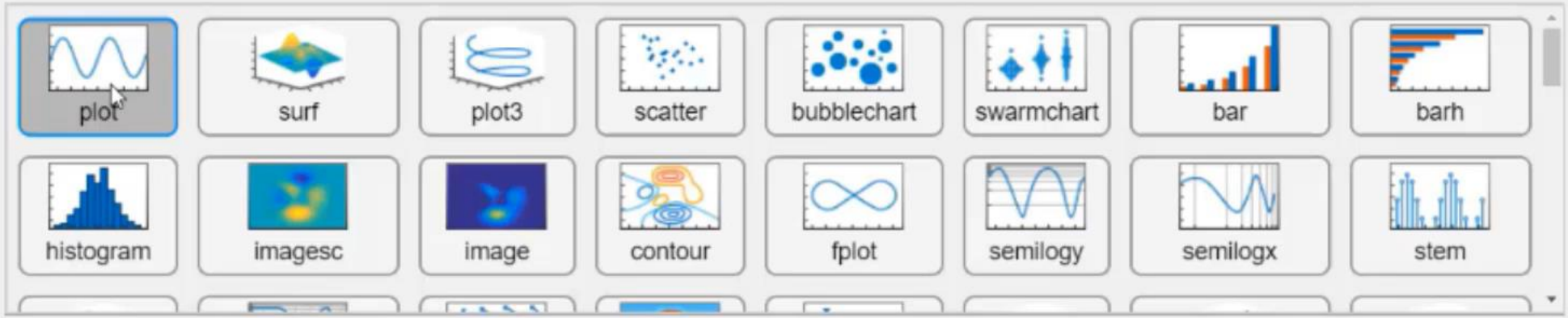
Create Plot

Create a plot interactively

Select visualization

Search for a visualization

Filter by Category: All



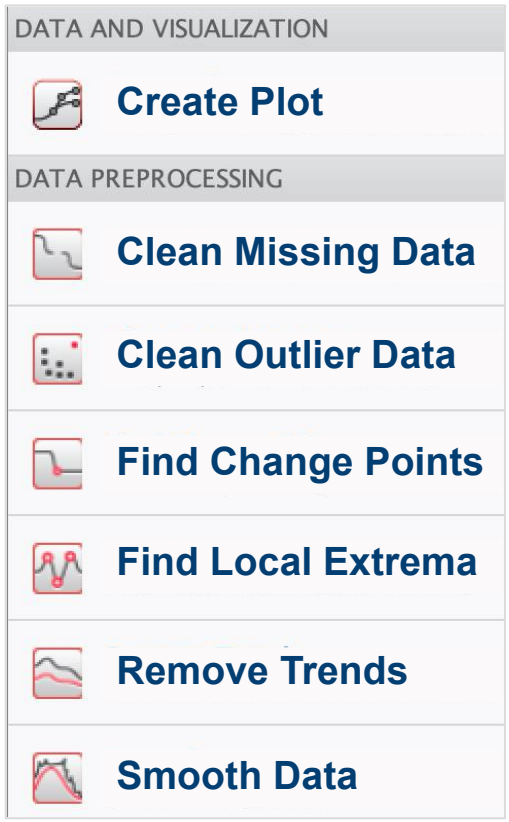
Select data

X: default

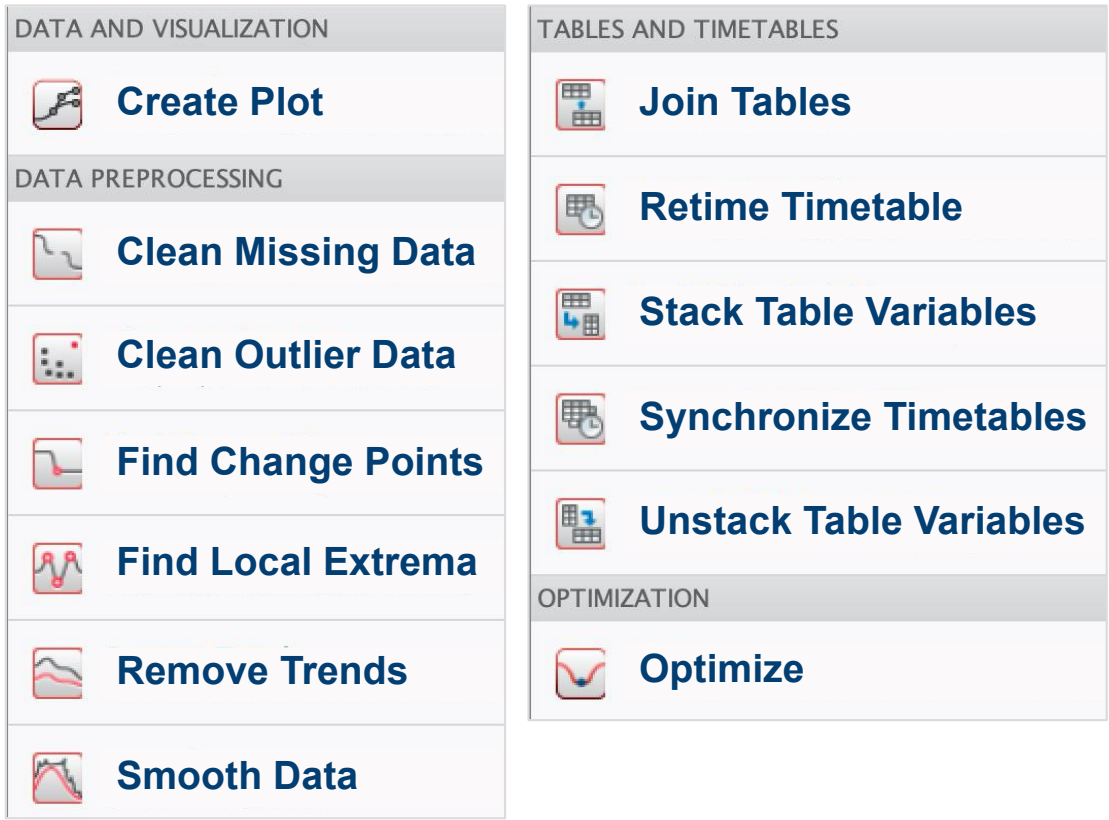
Y: select * This field is required.

Select optional visualization parameters

Live Editor Tasks nahrádzajú tvorbu programu



Live Editor Tasks nahrádzajú tvorbu programu



Live Editor Tasks nahrádzajú tvorbu programu

DATA AND VISUALIZATION

- Create Plot

DATA PREPROCESSING

- Clean Missing Data
- Clean Outlier Data
- Find Change Points
- Find Local Extrema
- Remove Trends
- Smooth Data

TABLES AND TIMETABLES

- Join Tables
- Retime Timetable
- Stack Table Variables
- Synchronize Timetables
- Unstack Table Variables

OPTIMIZATION

- Optimize

CONTROL SYSTEM DESIGN AND ANALYSIS

- Convert Model Rate
- Reduce Model Order
- Tune PID Controller

PREDICTIVE MAINTENANCE

- Estimate Approximate Entropy
- Estimate Correlation Dimension
- Estimate Lyapunov Exponent
- Extract Spectral Features
- Reconstruct Phase Space

Live Editor Tasks nahrádzajú tvorbu programu

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SYSTEM IDENTIFICATION

- Estimate Process Model
- Estimate State-Space Model

SIGNAL PROCESSING AND COMMUNICATIONS

- Extract Audio Features

SYMBOLIC MATH

- Simplify Symbolic Expressio
- Solve Symbolic Equation

IMAGE ACQUISITION

- Acquire Webcam Image

Rýchla editácia modelov

MSD_System * - Simulink

SIMULATION DEBUG MODELING FORMAT APPS

New Open Save Print FILE

Library Browser LIBRARY

Log Signals Add Viewer Signal Table PREPARE

Stop Time 10.0

Normal

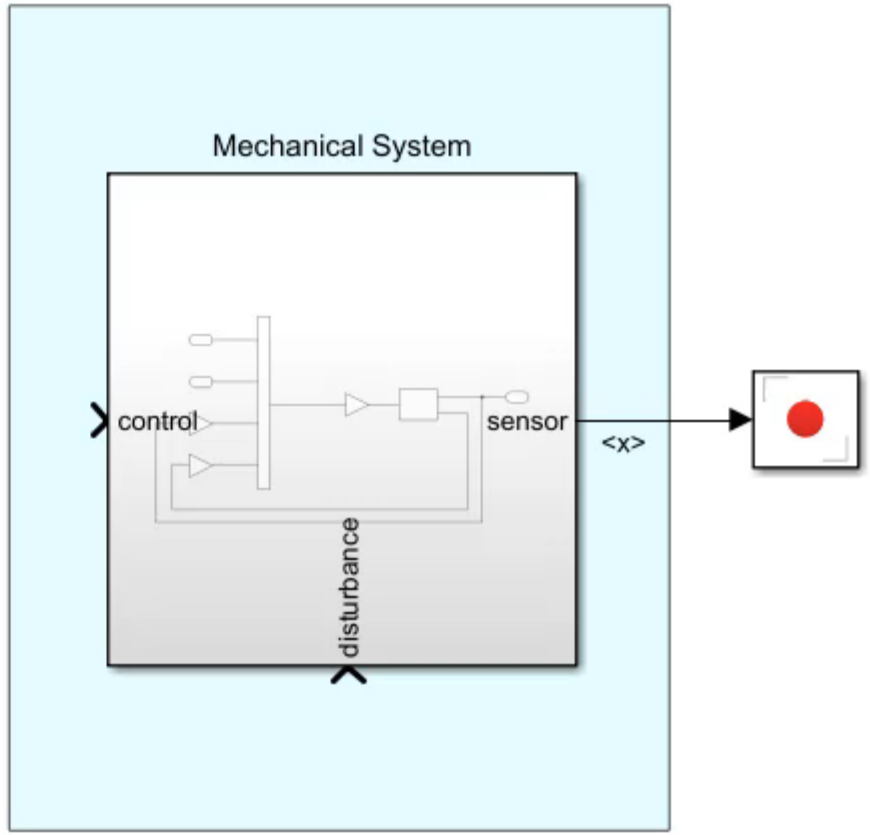
Fast Restart

Step Back Run Step Forward Stop SIMULATE

Data Inspector Logic Analyzer Bird's-Eye Scope REVIEW RESULTS

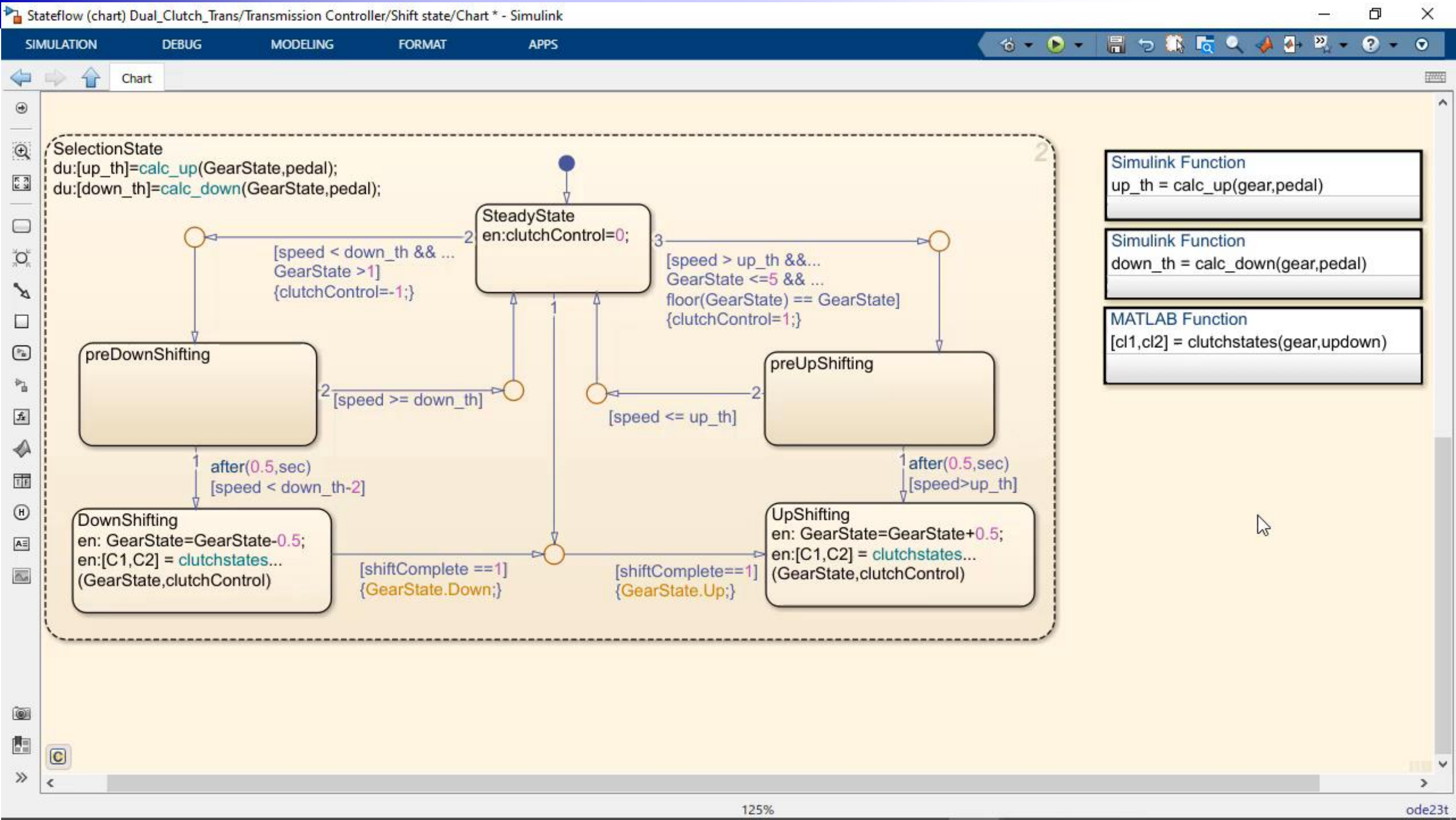
Model Browser

MSD_System



Property Inspector

Ready 150% VariableStepAuto


Stateflow (chart) Dual_Clutch_Trans/Transmission Controller/Shift state/Chart * - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
Chart
SelectionState
du:[up_th]=calc_up(GearState,pedal);
du:[down_th]=calc_down(GearState,pedal);
SteadyState
en:clutchControl=0;
[speed < down_th && ...
GearState >1]
{clutchControl=-1;}
[speed > up_th &&...
GearState <=5 && ...
floor(GearState) == GearState]
{clutchControl=1;}
preDownShifting
[speed >= down_th]
[speed <= up_th]
preUpShifting
after(0.5,sec)
[speed < down_th-2]
after(0.5,sec)
[speed>up_th]
DownShifting
en: GearState=GearState-0.5;
en:[C1,C2] = clutchstates...
(GearState,clutchControl)
[shiftComplete ==1]
{GearState.Down;}
[shiftComplete==1]
{GearState.Up;}
UpShifting
en: GearState=GearState+0.5;
en:[C1,C2] = clutchstates...
(GearState,clutchControl)
Simulink Function
up_th = calc_up(gear,pedal)
Simulink Function
down_th = calc_down(gear,pedal)
MATLAB Function
[cl1,cl2] = clutchstates(gear,updown)
125%
ode23t

Možnosti Simulinku po ruke

ssc_dcmotor/DC Motor * - Simulink

SIMULATION DEBUG MODELING FORMAT APPS

New Open Save Print FILE

Library Browser LIBRARY

Log Signals Add Viewer Signal Table PREPARE

Stop Time 0.2

Normal

Fast Restart

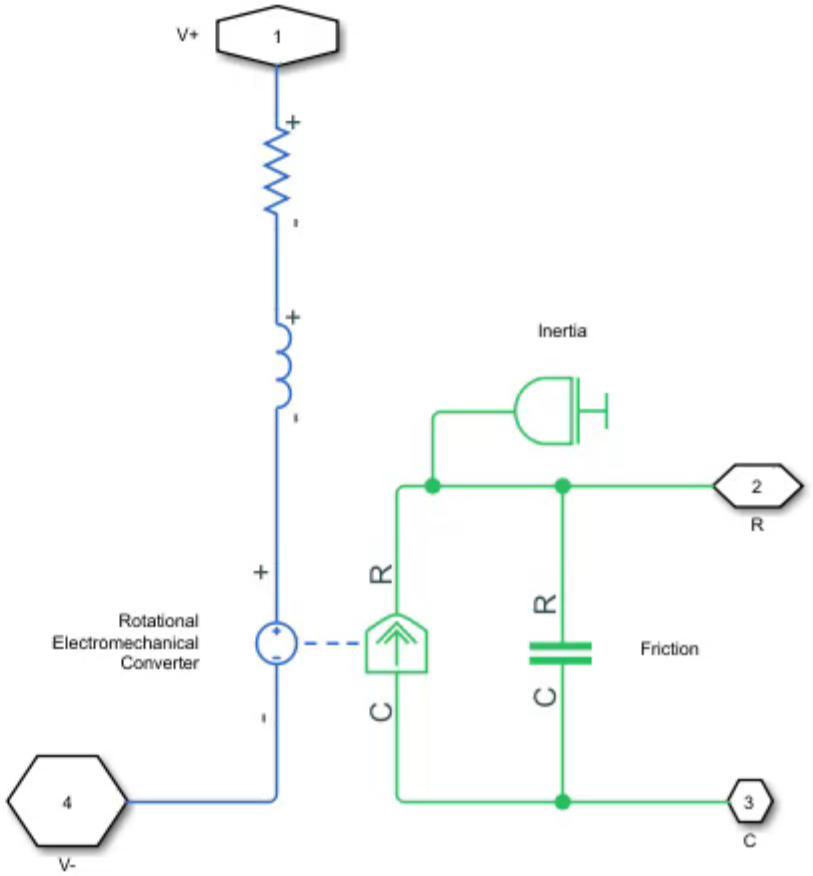
Step Back Run Step Forward Stop SIMULATE

Data Inspector Logic Analyzer Bird's-Eye Scope REVIEW RESULTS

DC Motor

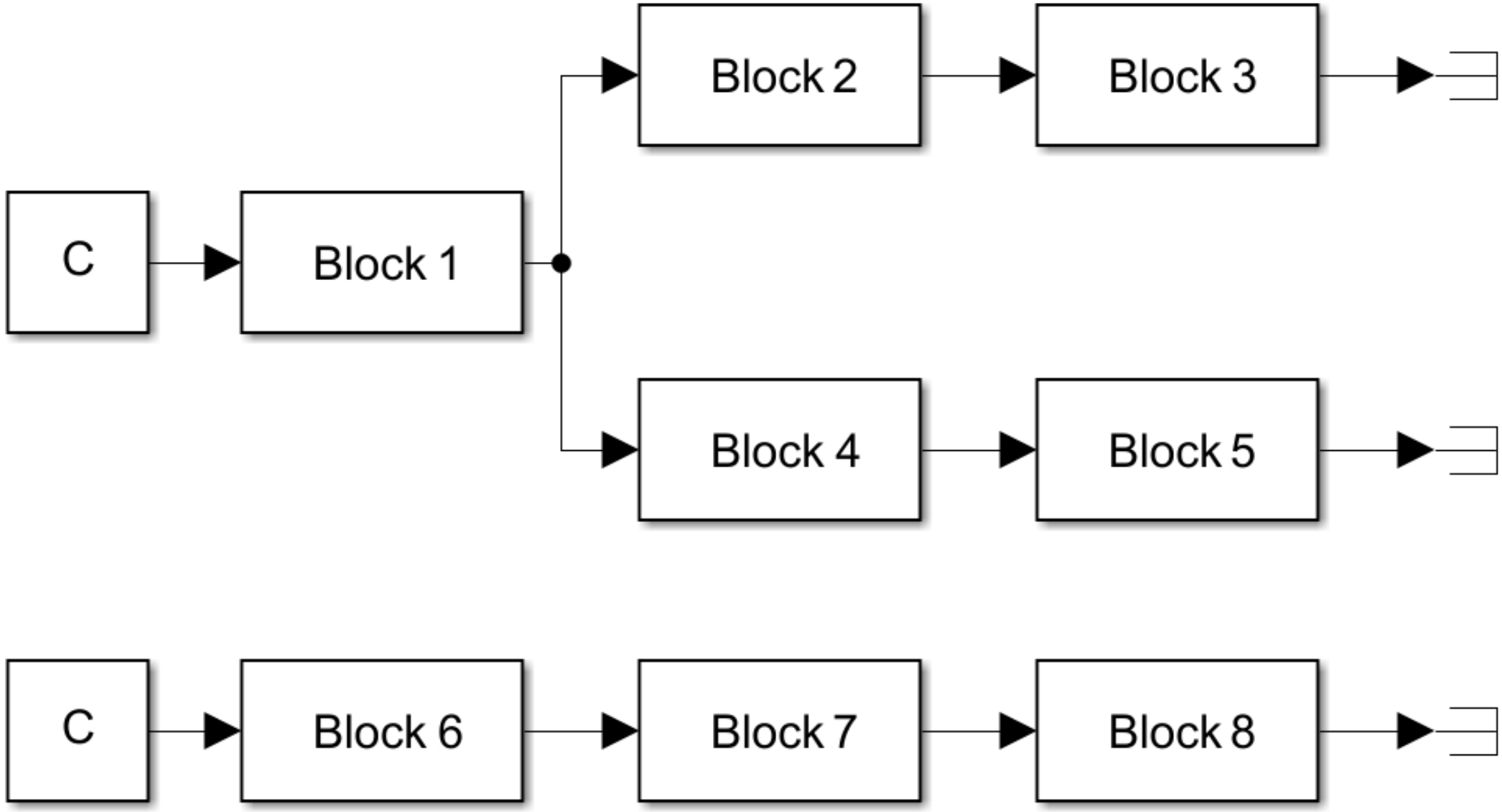
This implements the electromechanical components of a Faulhaber Series 0615 DC-Micromotor permanent magnet electric motor.

The containing system needs to provide voltage and mechanical load.



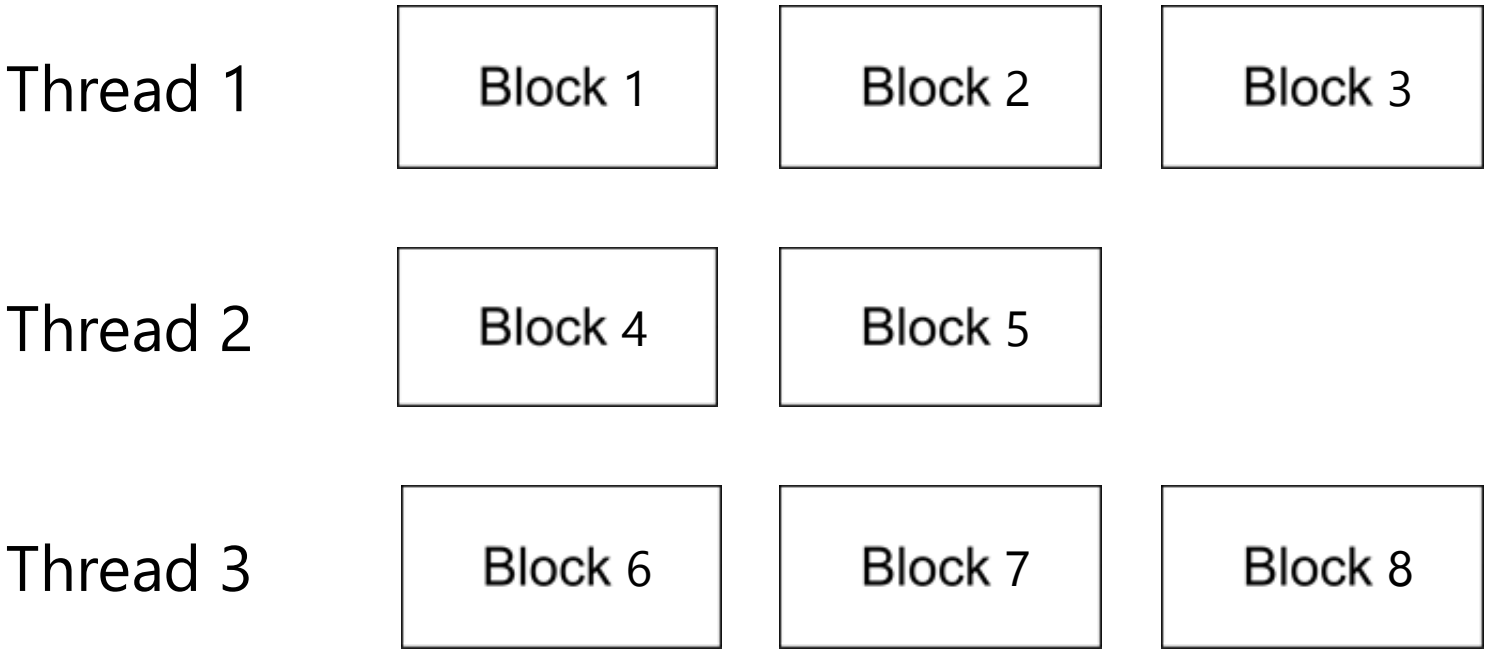
Ready 150% VariableStepAuto

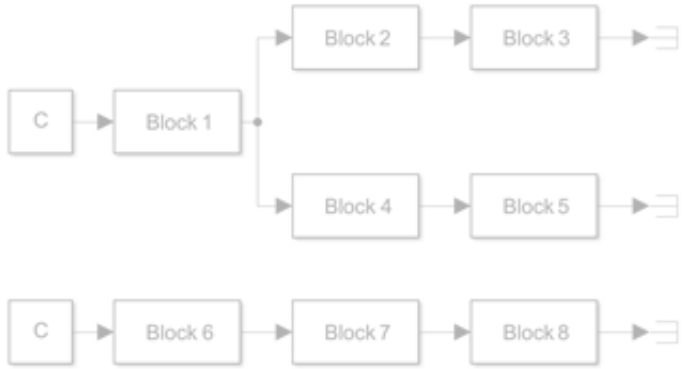
Zrýchlenie Simulinku


C
Block 1
Block 2
Block 3
Block 4
Block 5
C
Block 6
Block 7
Block 8

Sériovo – 27 sekúnd

Paralelne – 10 sekúnd





Parallel Execution

≈ 3x Speedup

Block 1 | Block 2 | Block 3

Block 4 | Block 5

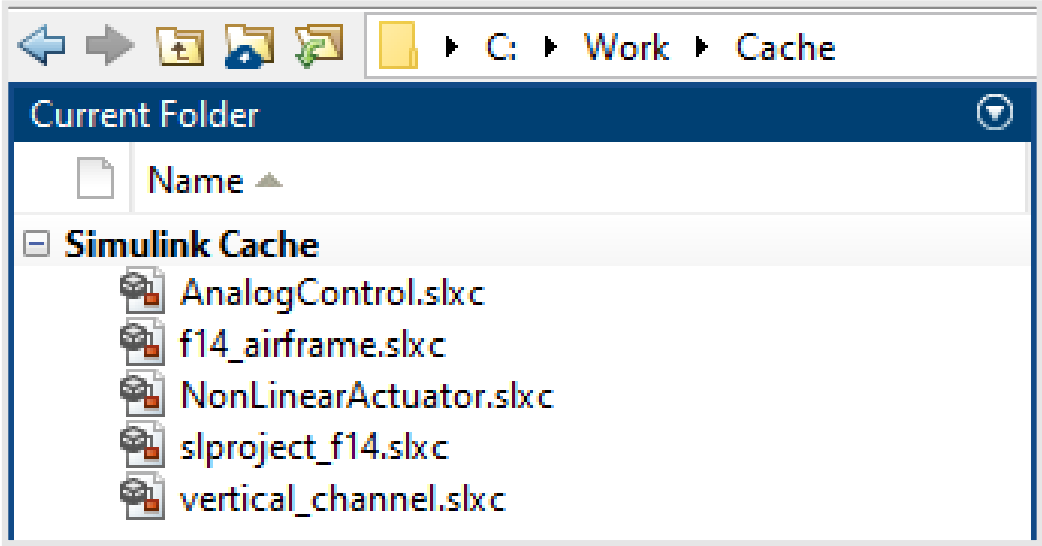
Block 6 | Block 7 | Block 8

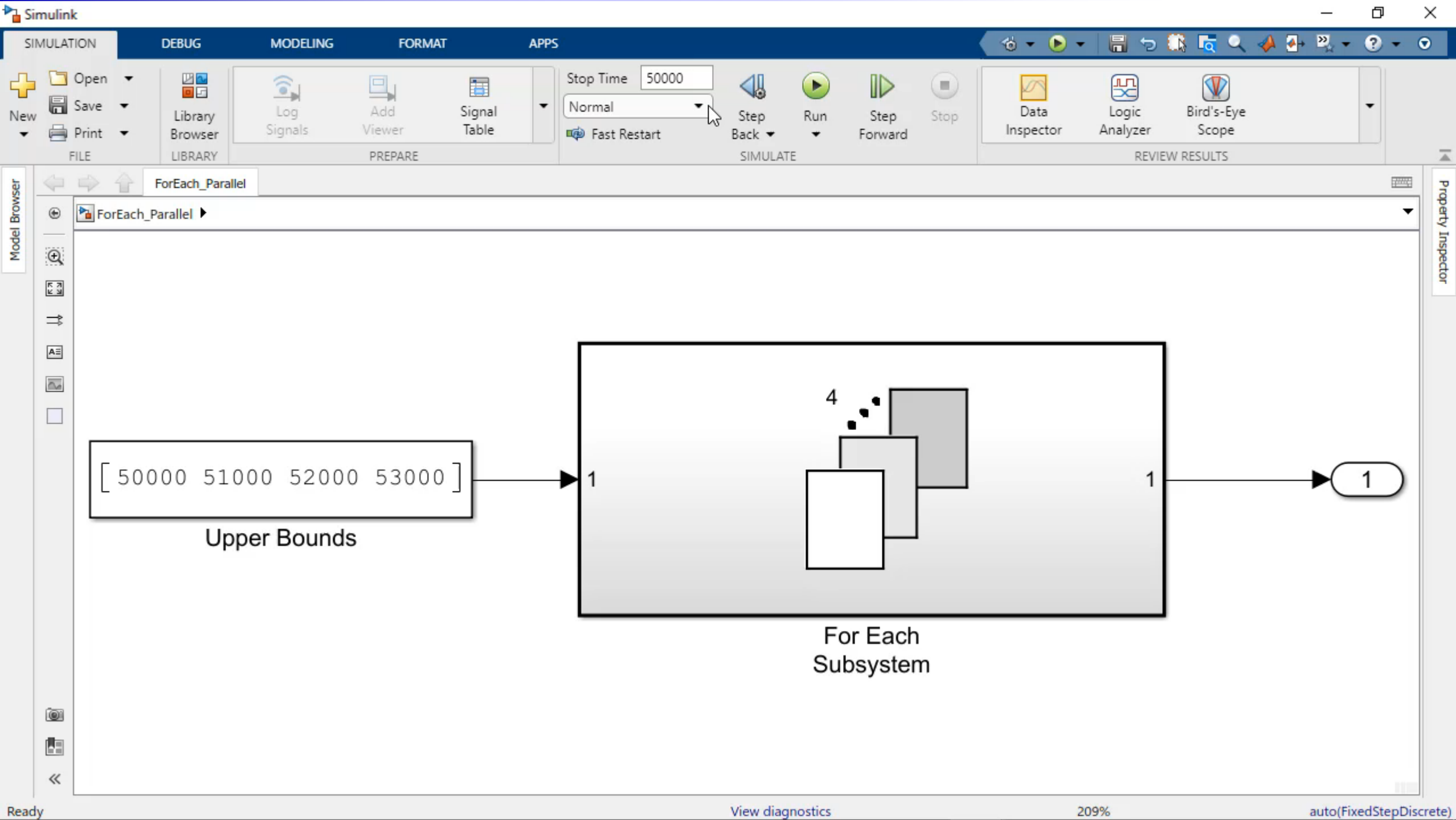
Model Reference

S-Function

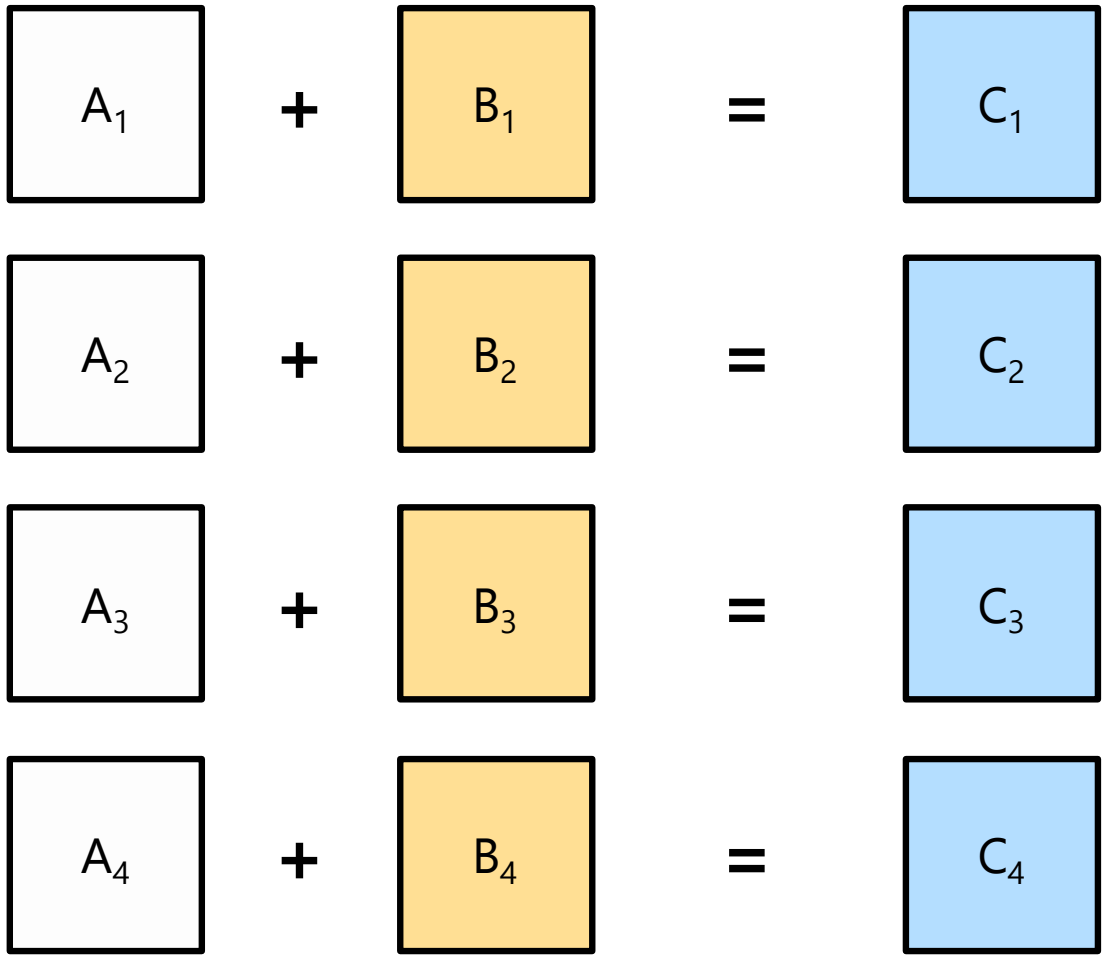
Co-Simulation
FMU

Simulink Cache

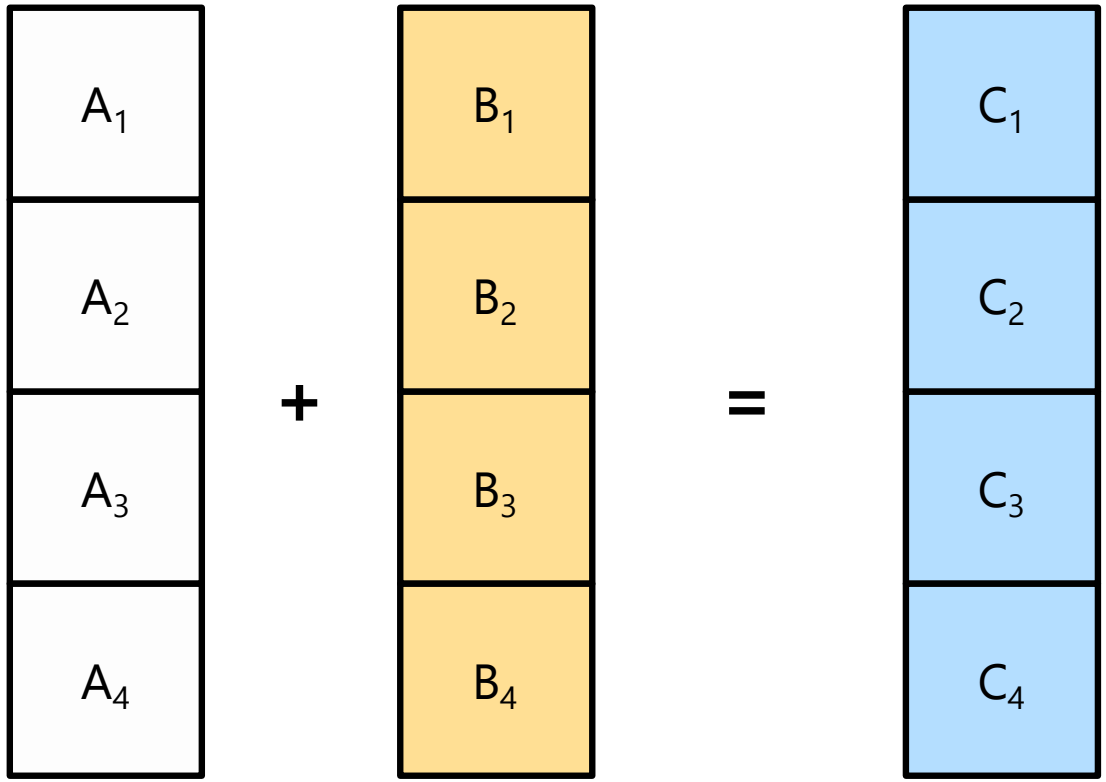



Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
New
Open
Save
Print
FILE
Library Browser
LIBRARY
Log Signals
Add Viewer
Signal Table
PREPARE
Stop Time
50000
Normal
Fast Restart
Step Back
Run
Step Forward
Stop
SIMULATE
Data Inspector
Logic Analyzer
Bird's-Eye Scope
REVIEW RESULTS
Model Browser
ForEach_Parallel
ForEach_Parallel
[50000 51000 52000 53000]
Upper Bounds
1
4
1
1
For Each Subsystem
Property Inspector
Ready
View diagnostics
209%
auto(FixedStepDiscrete)

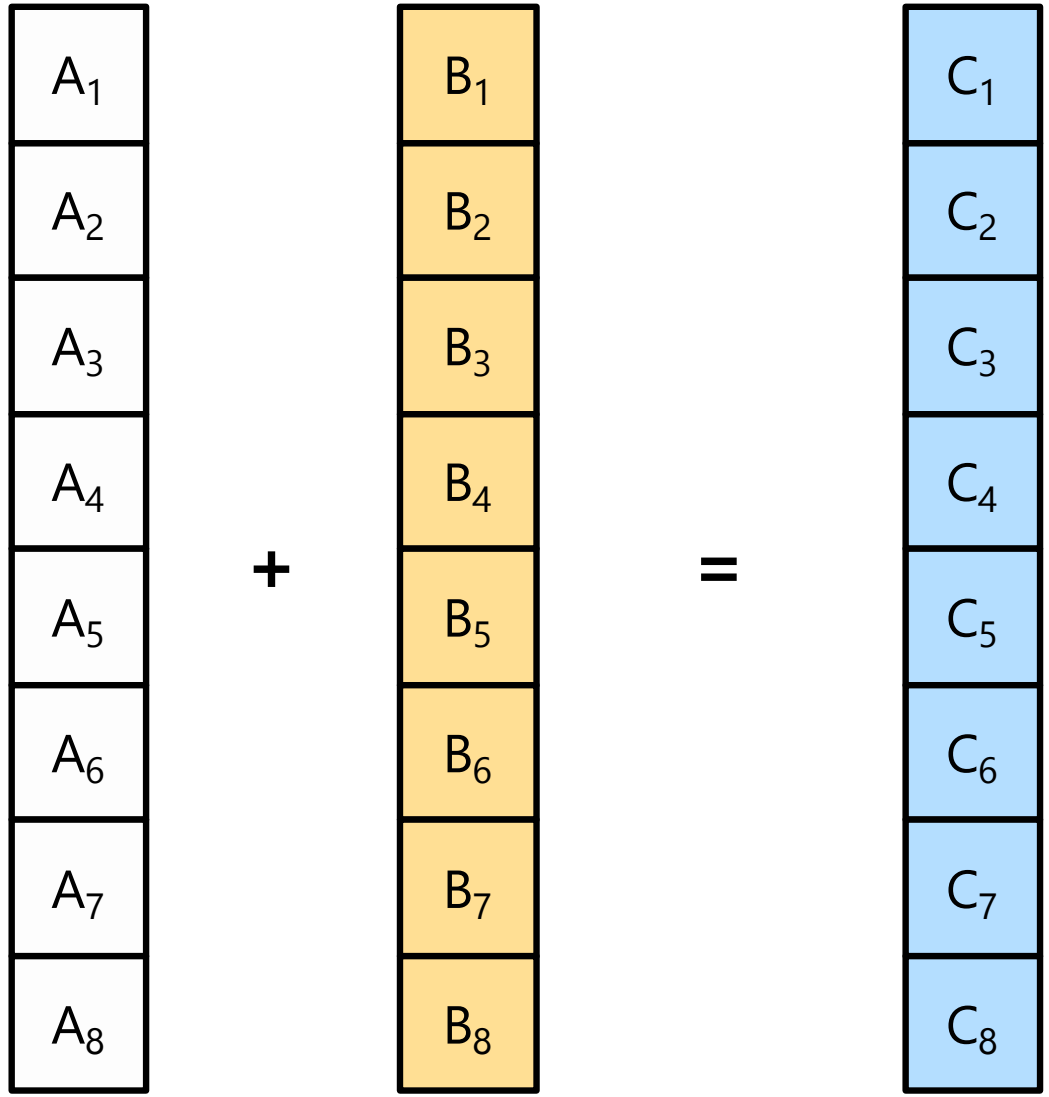
SIMD: Single Instruction Multiple Data



Skalárna operácia

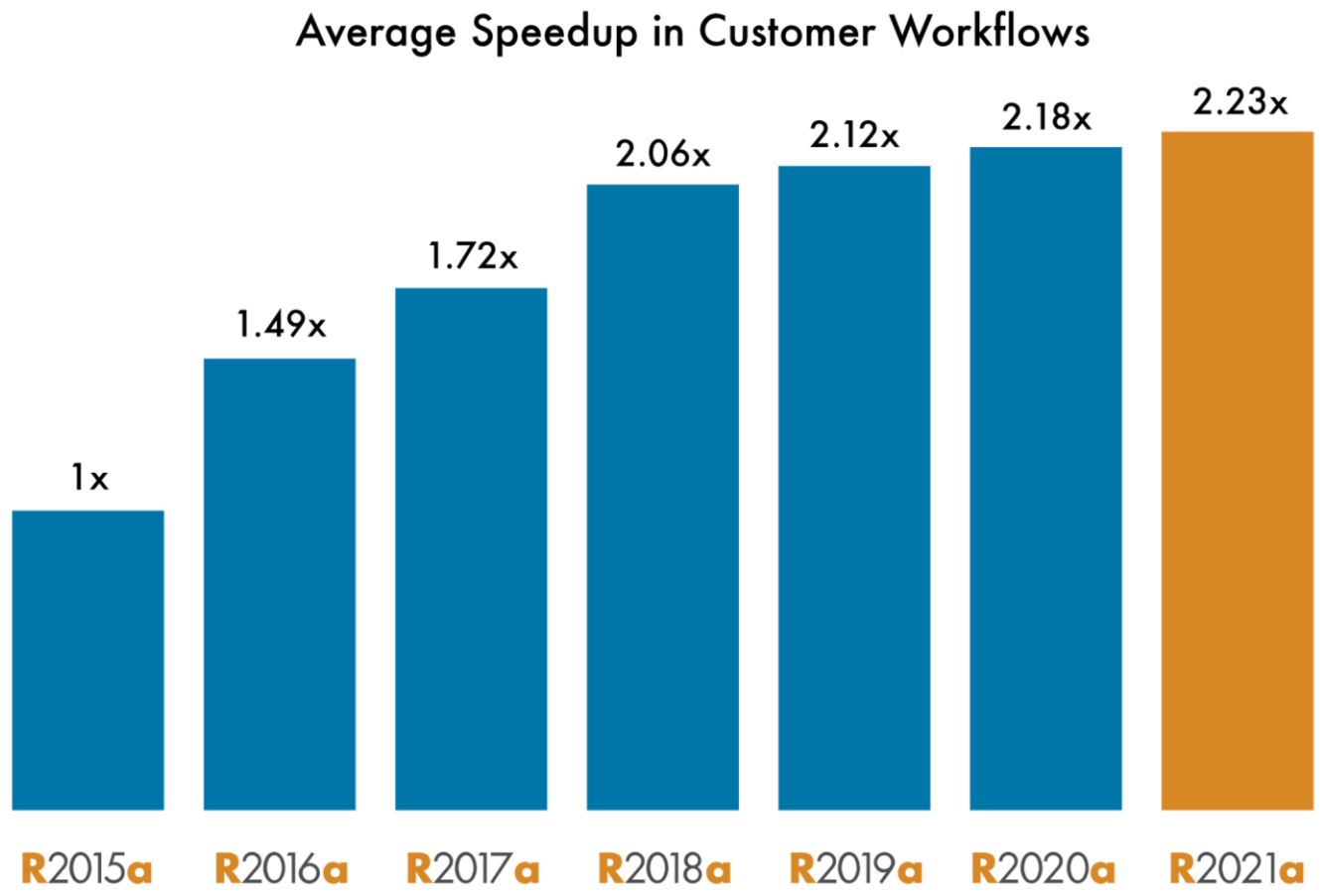


SIMD operation



SIMD operation

Priemerné zrýchlenie



Area	Description	Performance Improvement	Release
Graphics	rendering performance, large data sets in UI figures	6x	R2020a

Area	Description	Performance Improvement	Release
Graphics	rendering performance, large data sets in UI figures	6x	R2020a
Indexing	`datetime`, `duration`, and `calendarDuration` arrays	25x	R2020a
	`table` arrays	2x	R2020a

Area	Description	Performance Improvement	Release
Graphics	rendering performance, large data sets in UI figures	6x	R2020a
Indexing	`datetime`, `duration`, and `calendarDuration` arrays	25x	R2020a
	`table` arrays	2x	R2020a
Sparse	matrix multiplication linear systems	4-5x	R2021a

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R2021a

Performance

- Sparse Matrix Multiplication: Improved performance multiplying large sparse matrices
- Sparse Linear Systems: Improved performance solving sparse linear systems A*X = B with multicolumn B

Solving a linear system of the form `A*X = B` by executing `X = A\B` shows improved performance when `A` is a sparse square matrix and `B` is a matrix with two or more columns. The speedup applies to the solving step of the calculation but not the factorization step. The performance improvement arises from added support for multithreading, and therefore the speedup gets better as the number of columns in `B` increases.

For example, if you solve `A*X = B` using a `1e4`-by-`1e4` sparse coefficient matrix with approximately 40,000 nonzeros and a `B` matrix with 100 columns, performance in R2021a is about 5x faster than in R2020b on a machine with 6 physical cores. This code uses `decomposition` to factor the coefficient matrix, so only the solving process is timed. If you use `X = A\B` instead, you still see a speedup, but the time required to factor the matrix is included and has not changed.

```
function timingSparseBackslashMultRHS
rng default
A = sprand(1e4,1e4,0.0003) + speye(1e4);
B = sprand(1e4,100,0.002);
dA = decomposition(A);
tic
x = dA\B;
toc
end
```

The approximate execution times are:

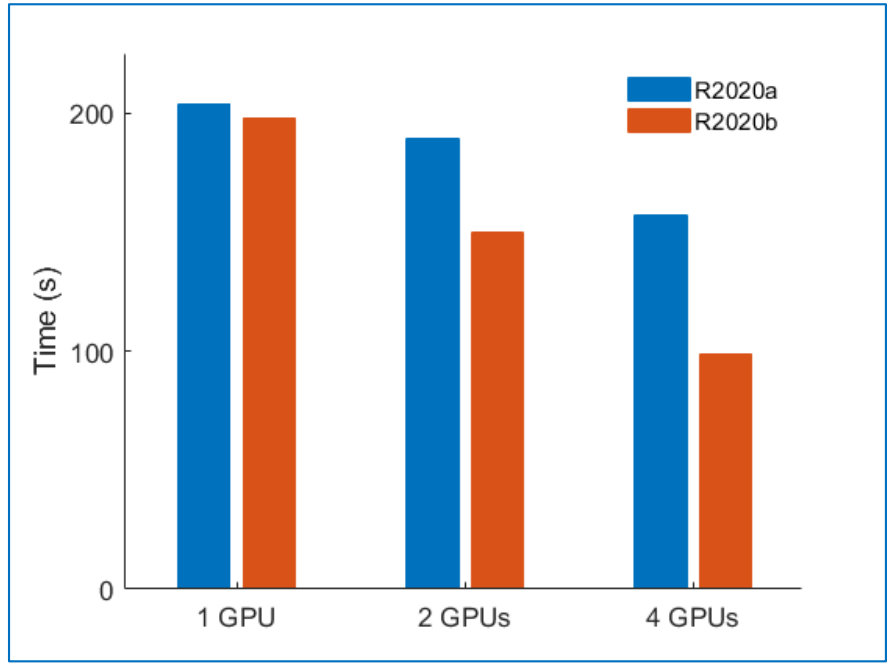
R2020b: 1.5 s

R2021a: 0.3 s

The code was timed on a Windows 10, Intel Xeon W-2133 CPU @ 3.60 GHz test system by calling the function `timingSparseBackslashMultRHS`.

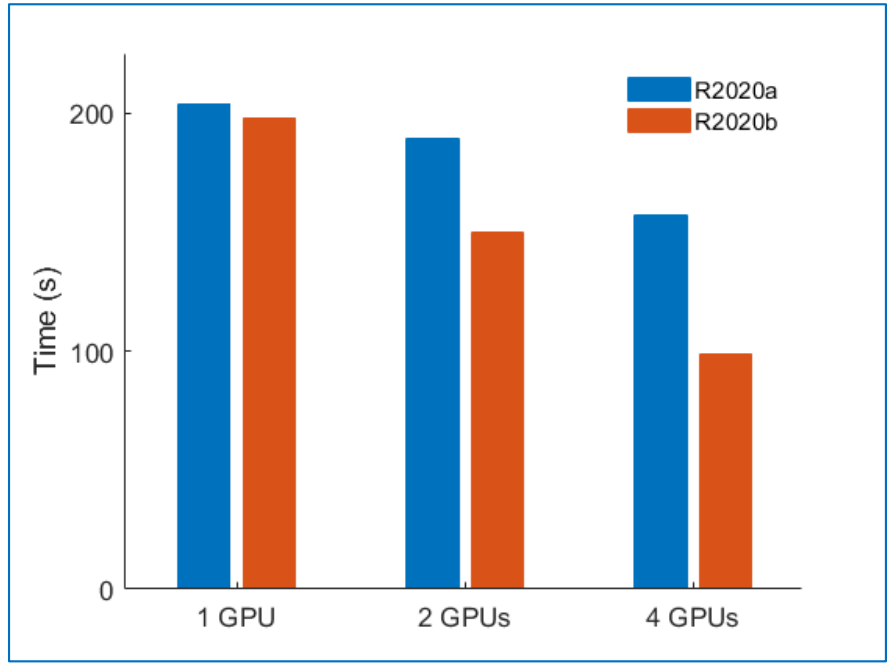
Deep Learning

Area	Description	Performance Improvement	Release
Training	Multi-GPU	1.6x	R2020a → R2020b



Deep Learning

Area	Description	Performance Improvement	Release
Training	Multi-GPU	1.6x	R2020a → R2020b
Inference	GPU	2.8x	R2018b → R2021a
	CPU	2.5x	



Zjednodušenie programovania

```
readtable("myfile.xlsx","TextType","string","Encoding","UTF-8")
```

```
readtable("myfile.xlsx", TextType="string", Encoding="UTF-8")
```

name=value syntax

```
str = ["String was introduced in R2016b."
       " Pattern was added in R2020b."];
```

pattern object

```
str = ["String was introduced in R2016b."
       " Pattern was added in R2020b."];
```

Create a pattern to match releases

```
pat = "R" + digitsPattern(4) + ("a"|"b");
```

pattern object

```
str = ["String was introduced in R2016b."
       " Pattern was added in R2020b."];
```

Create a pattern to match releases

```
pat = "R" + digitsPattern(4) + ("a"|"b");
```

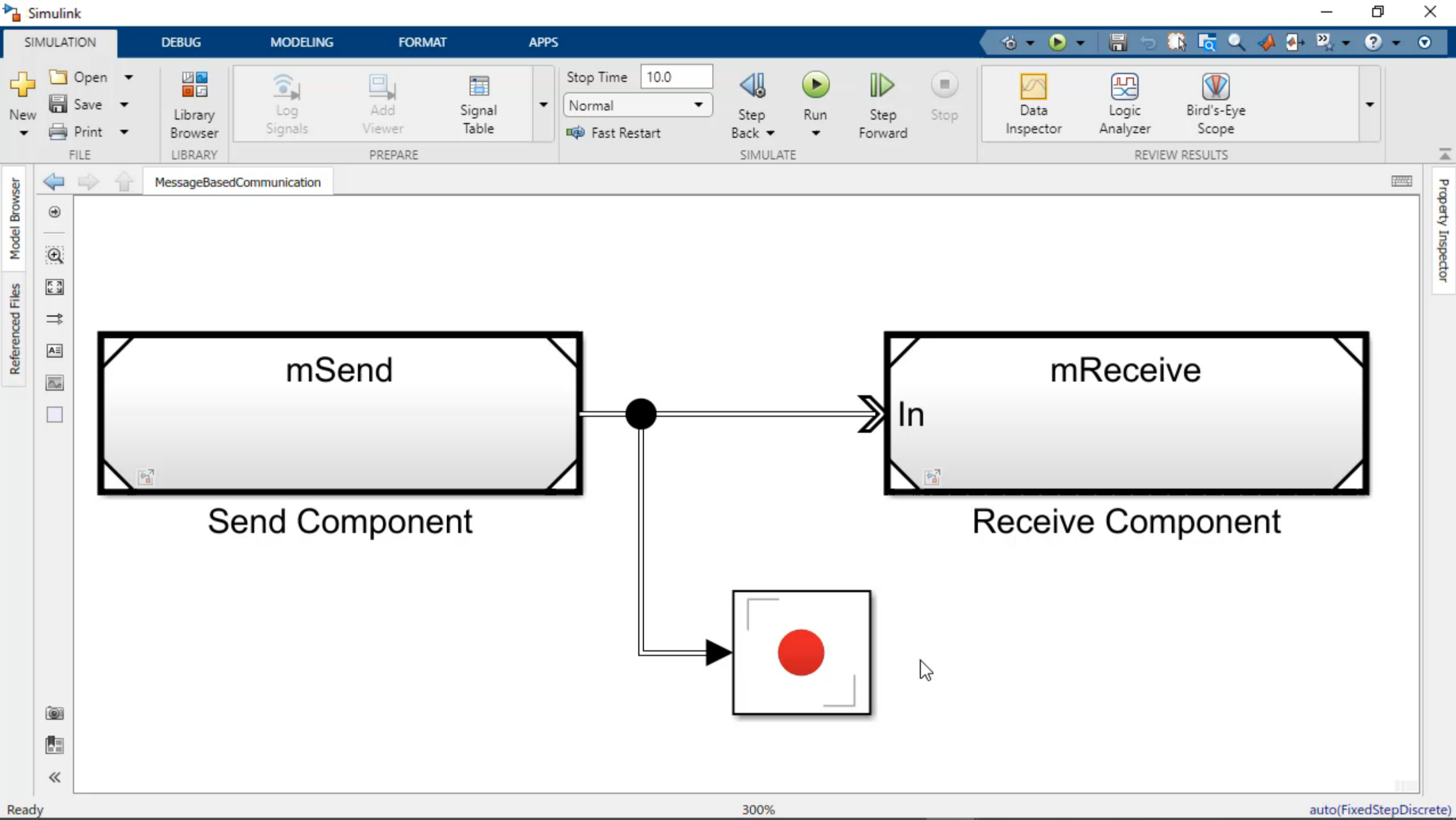
Extract the releases that were mentioned

```
extract(str,pat)
```

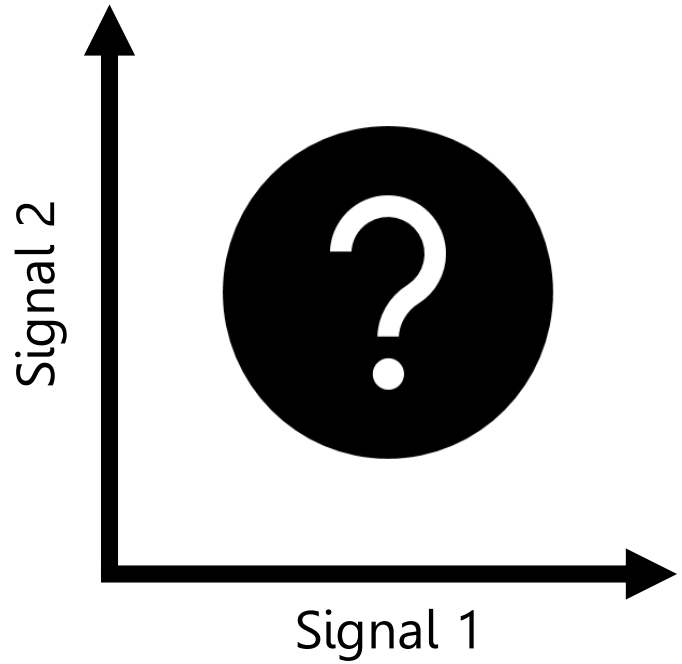
```
ans = 2×1 string
    "R2016b"
    "R2020b"
```

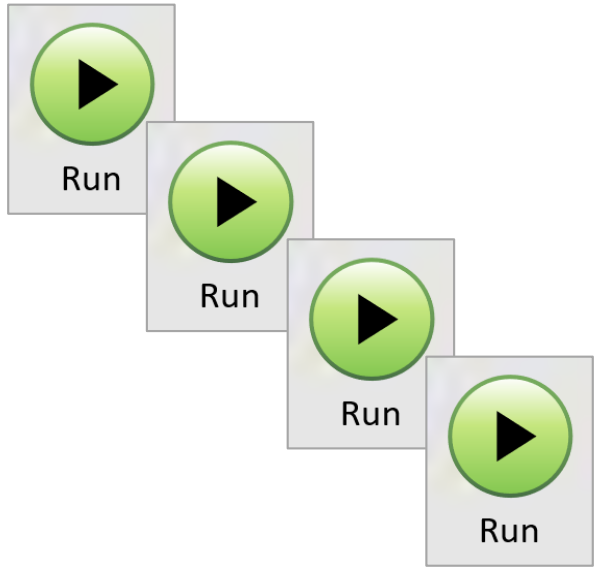
pattern object

Analýza a skúmanie dát v Simulinku

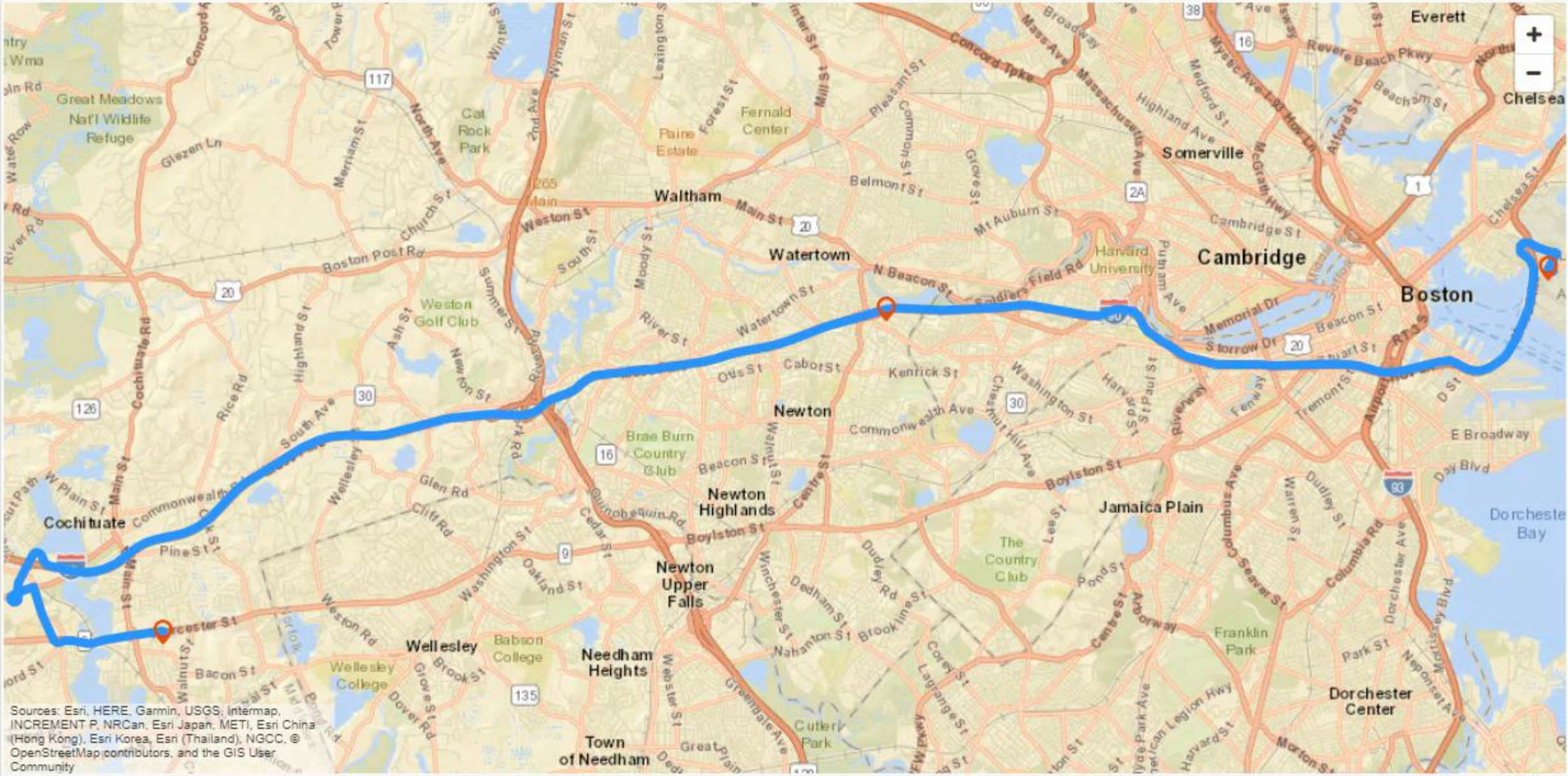

Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
New
Open
Save
Print
FILE
Library Browser
LIBRARY
Log Signals
Add Viewer
Signal Table
PREPARE
Stop Time
10.0
Normal
Fast Restart
Step Back
Run
Step Forward
Stop
SIMULATE
Data Inspector
Logic Analyzer
Bird's-Eye Scope
REVIEW RESULTS
Model Browser
Referenced Files
MessageBasedCommunication
mSend
Send Component
mReceive
In
Receive Component
Property Inspector
Ready
300%
auto(FixedStepDiscrete)


Belmont
Waltham
Watertown
Cambridge
Somerville
Medford
Malden
Everett
Revere
Chelsea
Newton
Brookline
Boston
Dedham
Milton
Dorchester Heights Monument
Gen. Edward Logan Intl. Arpt.
Winthrop
El. 20 ft.
SUFFOLK
NORFOLK
LONG
PEDDOCKS
Windmill Pt.
TUNNEL (TOLL)
John F. Kennedy Nat'l. Hist. Site


Signal 2
Signal 1


Run
Run
Run
Run

Simulation Data Inspector - ElectricVehicleModel.mldatx



8x

874.3 / 2045.0

Simulation Data Inspector - ElectricVehicleModel.mldatx

Inspect | Compare

Filter Signals

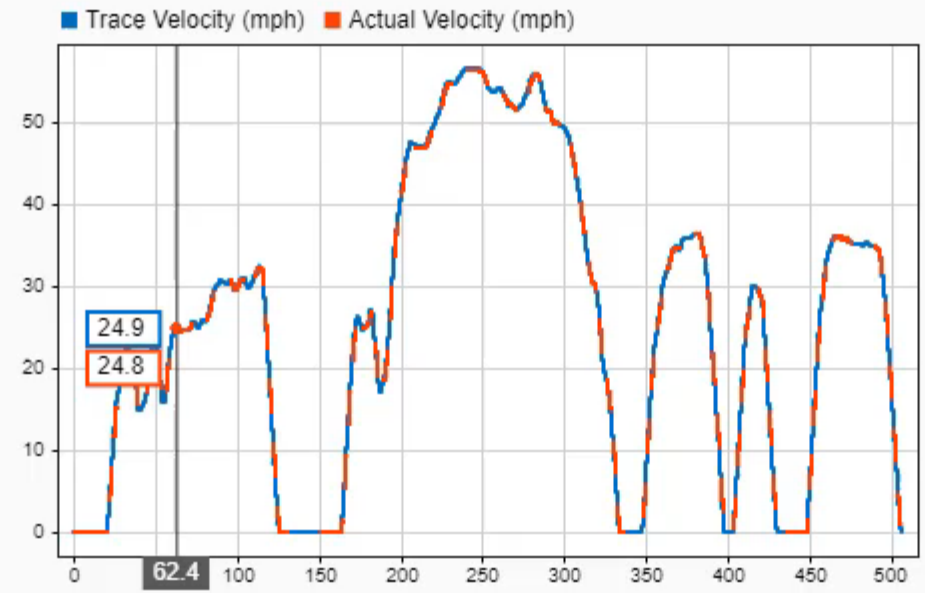
NAME	LINE
Run 13: EvReferenceApplication [Current]	
Trace Velocity (mph)	
Actual Velocity (mph)	
US Fuel Economy (MPGe)	
Battery SOC (%)	
Motor Speed (RPM)	
Motor Torque (Nm)	
Battery Current (A)	
L/100Km	

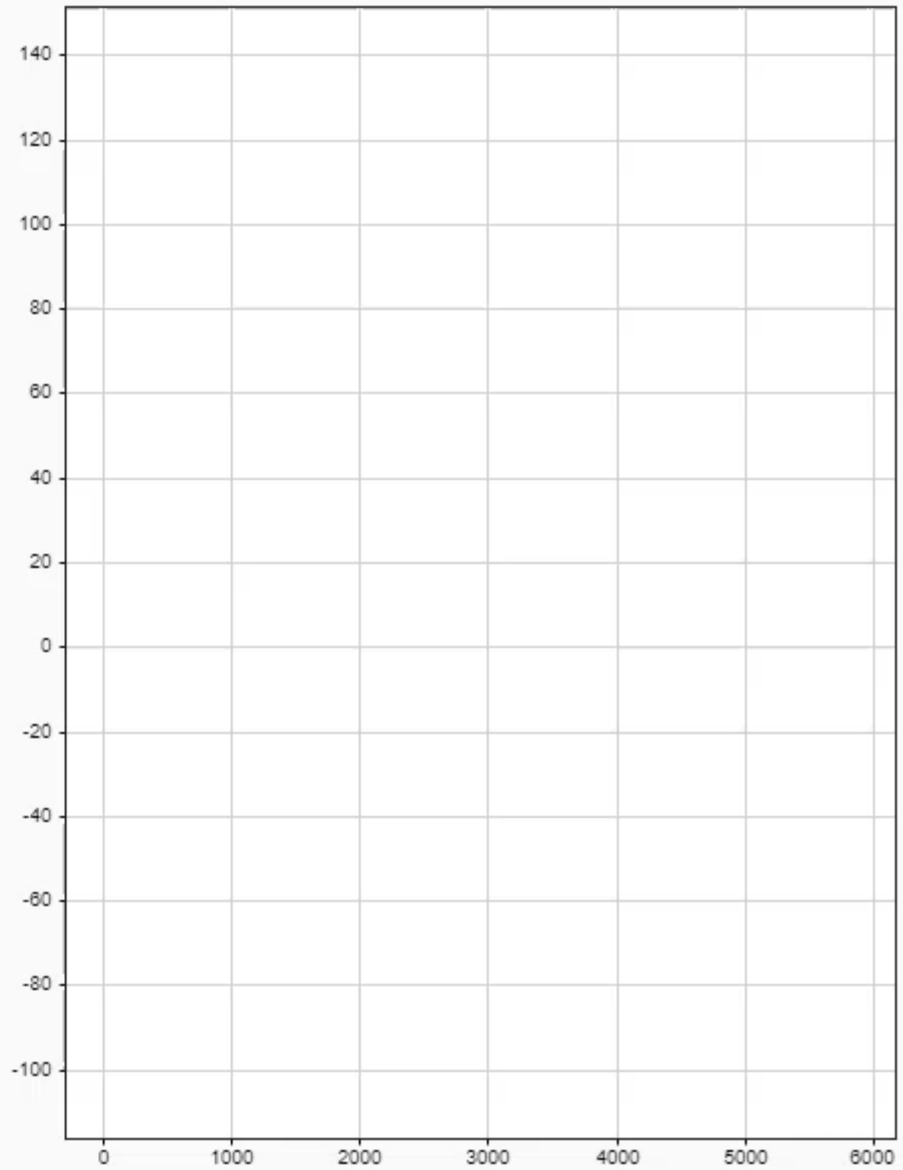
Archive (2)

- Run 11: EvReferenceApplication
- Run 12: EvReferenceApplication

Properties

Select signals to display

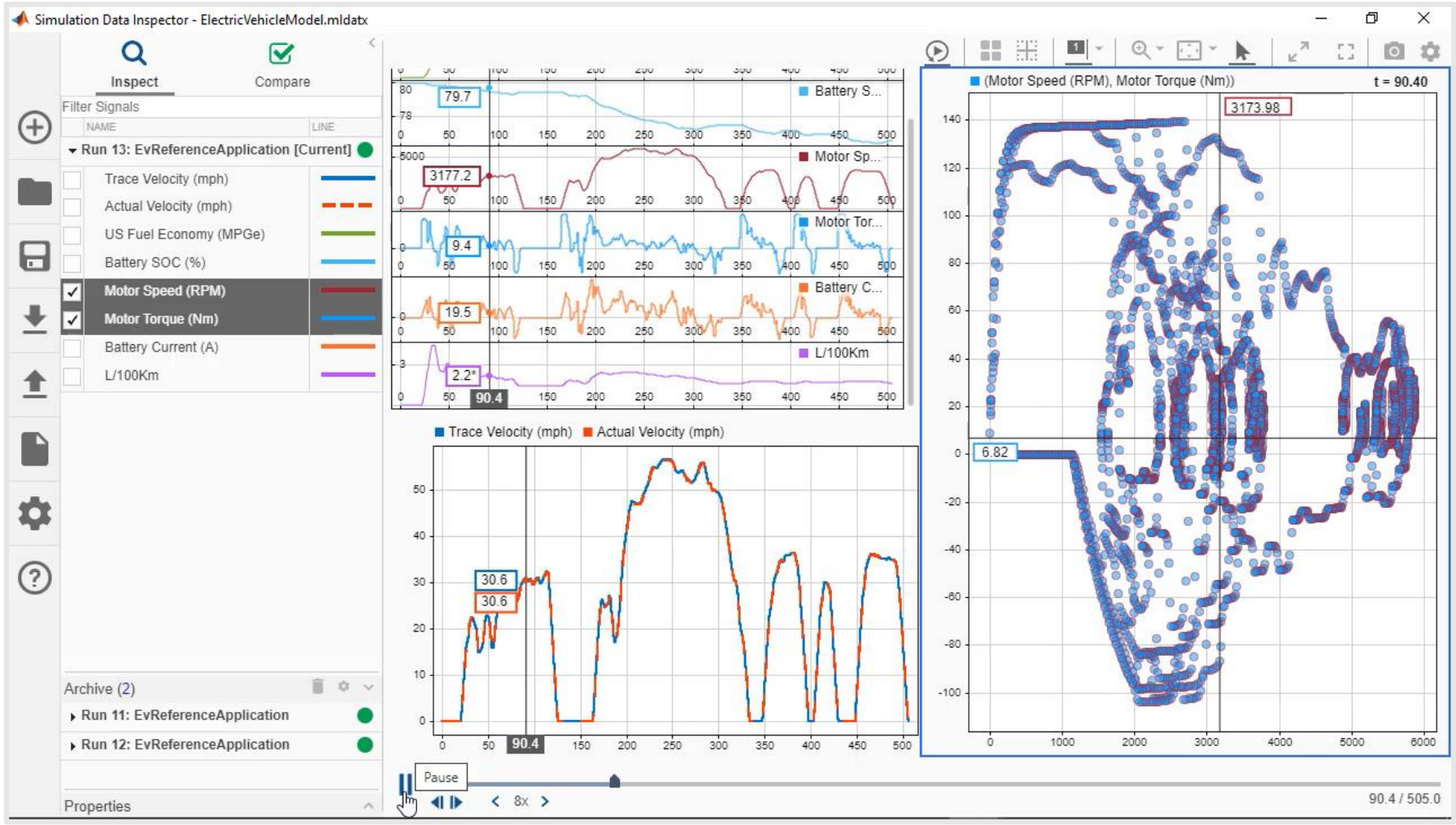




8x

62.4 / 505.0

Analýza bez písania kódu



Signal Management

`Simulink.sdi.getSignal`	Get Simulink.sdi.Signal object for a signal
`Simulink.sdi.deleteSignal`	Delete signal in the Simulation Data Inspector
`Simulink.sdi.markSignalForStreaming`	Turn logging on or off for a signal
`convertUnits`	Convert units of `Simulink.sdi.Signal` object
`export`	Export `Simulink.sdi.Signal` object to workspace or file
`getAsTall`	Create tall timetable from `Simulink.sdi.Signal` object
`plotOnSubPlot`	Plot `Simulink.sdi.Signal` object on Simulation Data Inspector subplot

Data Management

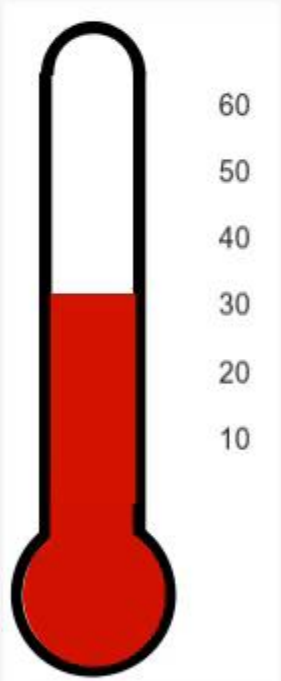
`Simulink.sdi.getArchiveRunLimit`	Determine configured run limit for Simulation Data Inspector archive
`Simulink.sdi.setArchiveRunLimit`	Specify a limit for the number of runs stored in the Simulation Data Inspector archive
`Simulink.sdi.getAutoArchiveMode`	Determine if the Simulation Data Inspector is configured to automatically archive
`Simulink.sdi.setAutoArchiveMode`	Specify whether the Simulation Data Inspector automatically archives simulation runs
`Simulink.sdi.save`	Save Simulation Data Inspector session
`Simulink.sdi.load`	Load a Simulation Data Inspector session or view
`Simulink.sdi.clear`	Clear all data from the Simulation Data Inspector
`Simulink.sdi.report`	Generate a Simulation Data Inspector report
`loadIntoMemory`	Load logged data into memory

Data Access

`Simulink.sdi.Run`	Access run signals and metadata
`Simulink.sdi.Signal`	Access signal data and metadata
`Simulink.SimulationData.Parameter`	Stores logged parameter data and metadata
`Simulink.sdi.DiffRunResult`	Access run comparison results

Ladenie a monitorovanie bez detailov

Fault-Tolerant Fuel Control System Dashboard



Engine Speed (rpm)

Throttle Angle: NORMAL FAIL

Engine Speed: NORMAL FAIL

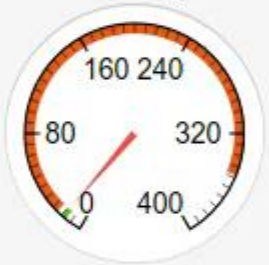
EGO: NORMAL FAIL

MAP: NORMAL FAIL

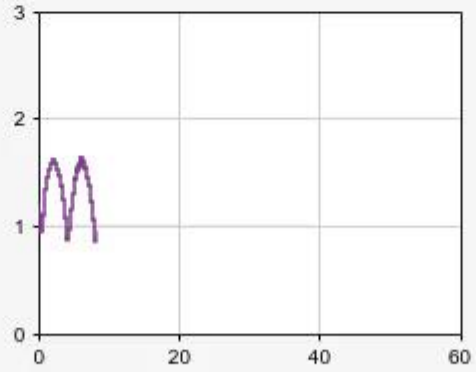
Fuel (g/s)

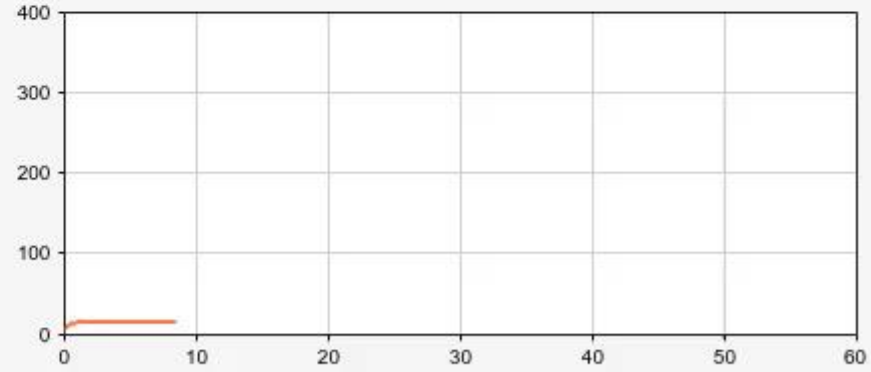
Air/Fuel Ratio Normal Range

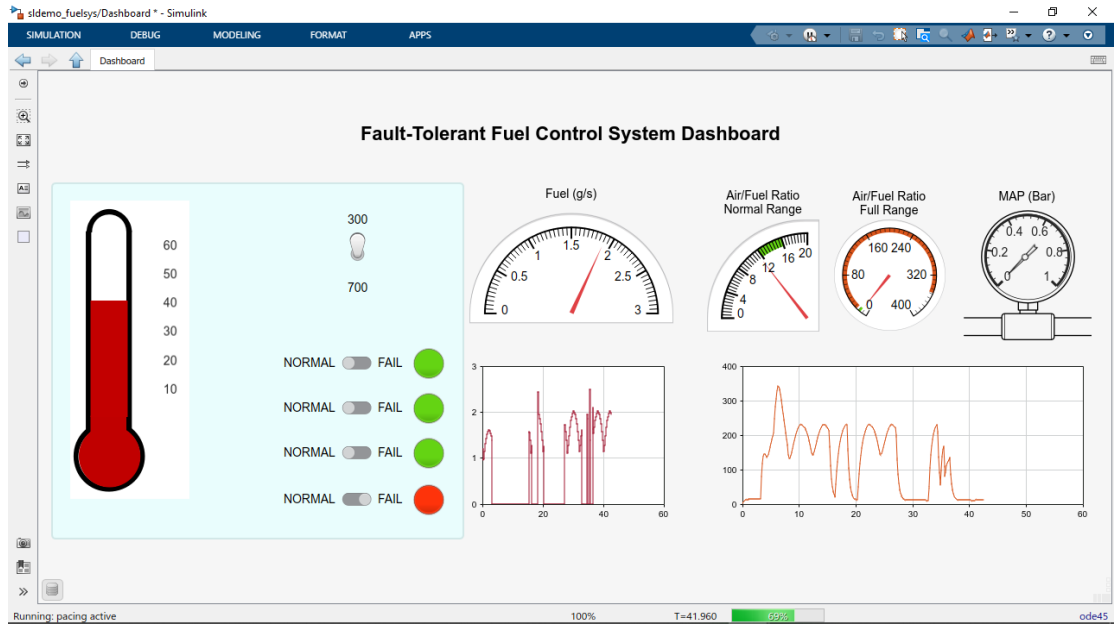
Air/Fuel Ratio Full Range

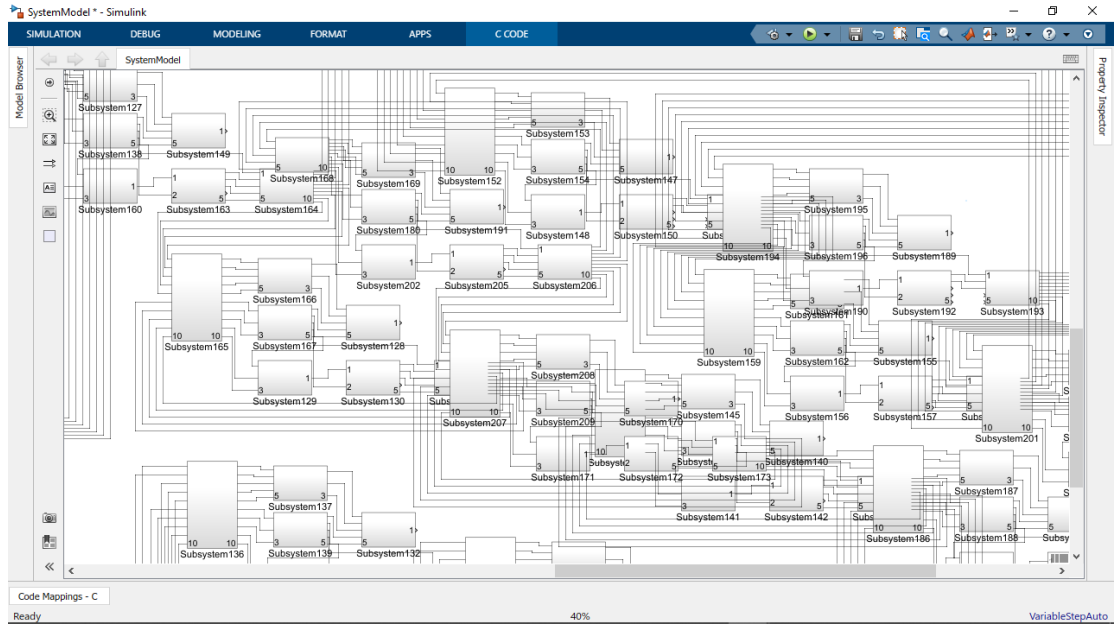


MAP (Bar)

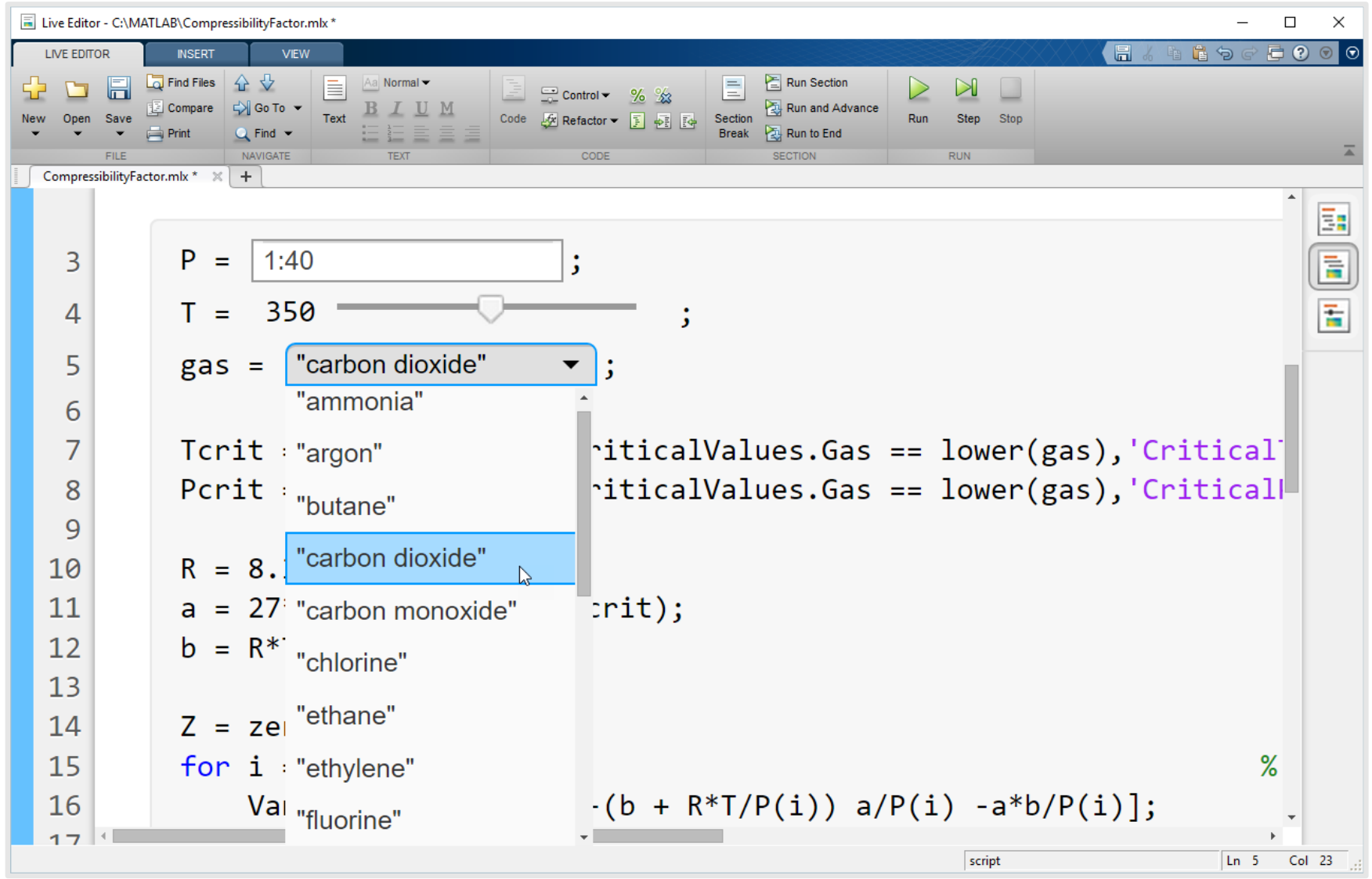


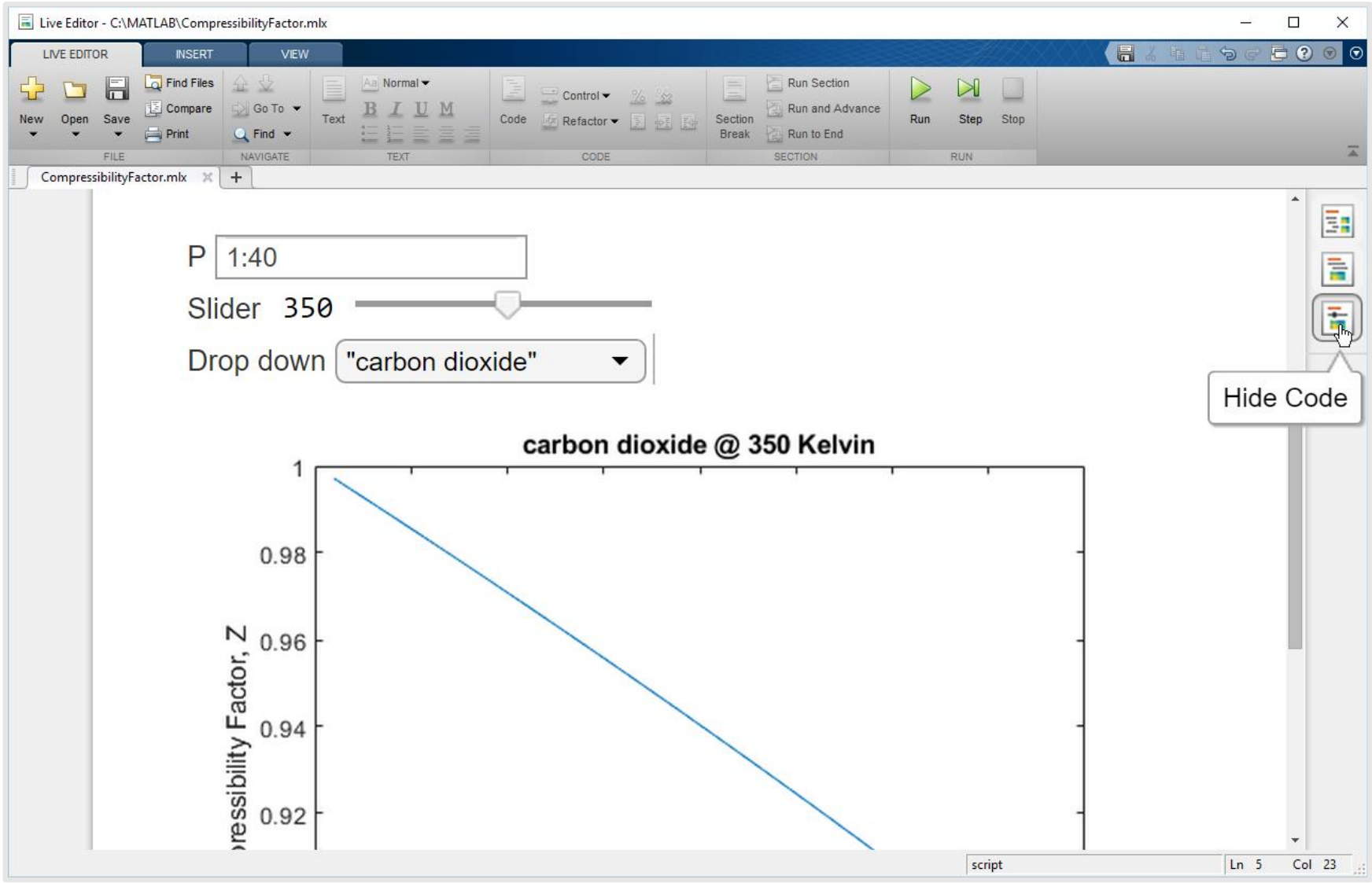



sldemo_fuelsys/Dashboard * - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
Dashboard
Fault-Tolerant Fuel Control System Dashboard
Fuel (g/s)
Air/Fuel Ratio Normal Range
Air/Fuel Ratio Full Range
MAP (Bar)
300
700
NORMAL
FAIL
Running: pacing active
100%
T=41.960
ode45


SystemModel * - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
C CODE
SystemModel
Model Browser
Property Inspector
Code Mappings - C
Ready
40%
VariableStepAuto

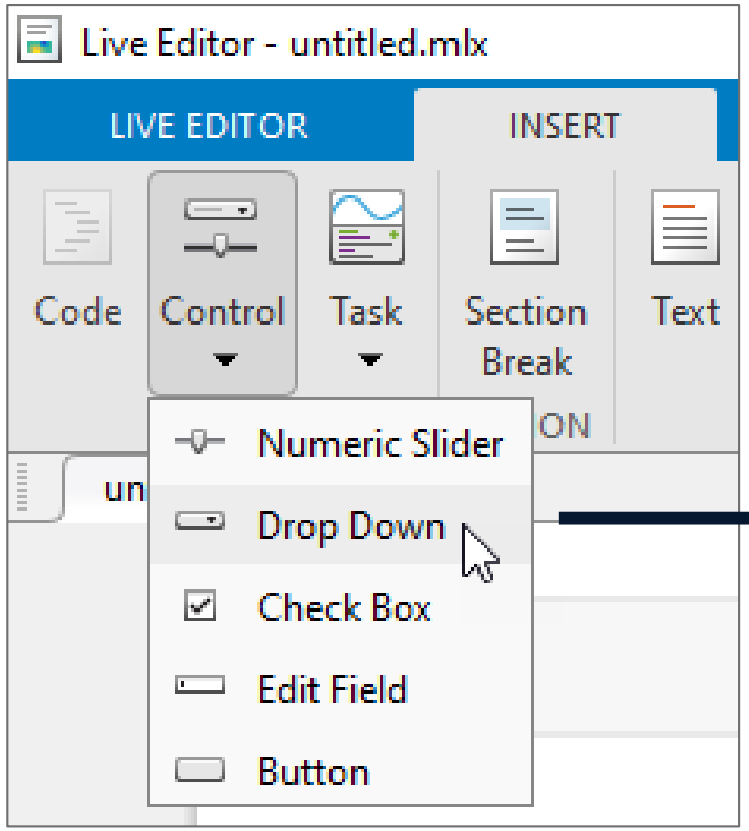
Ladenie algoritmov v MATLABe

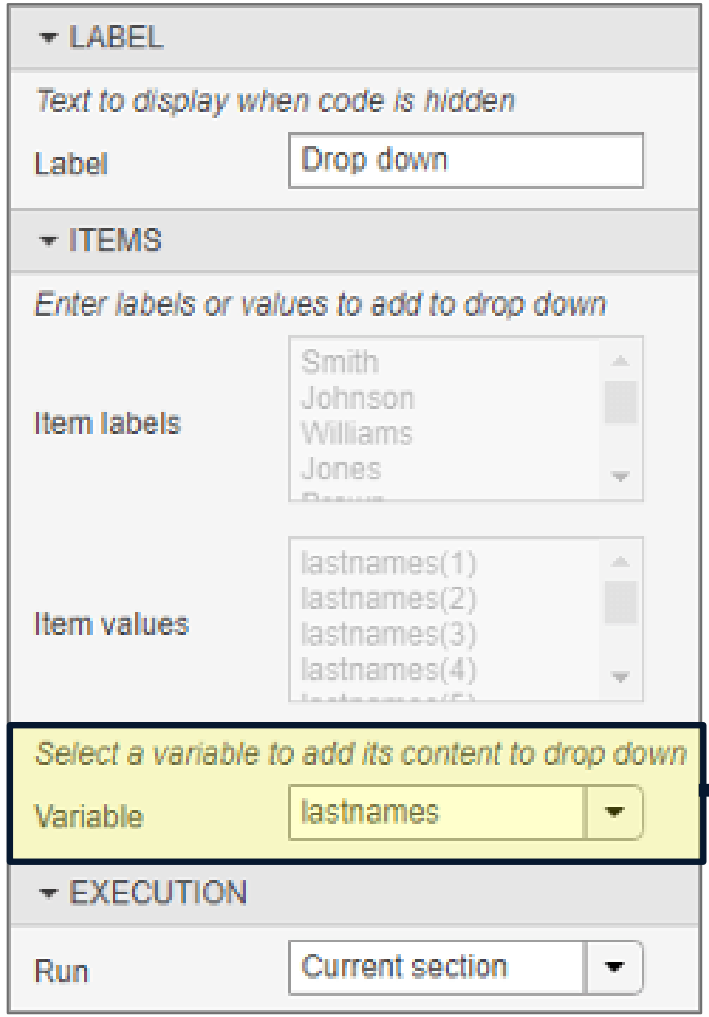

Live Editor - C:\MATLAB\CompressibilityFactor.mlx *
LIVE EDITOR
INSERT
VIEW
New
Open
Save
Find Files
Compare
Print
Go To
Find
Text
Normal
Code
Control
Refactor
Section Break
Run Section
Run and Advance
Run to End
Run
Step
Stop
FILE
NAVIGATE
TEXT
CODE
SECTION
RUN
CompressibilityFactor.mlx *
P = 1:40 ;
T = 350 ;
gas = "carbon dioxide" ;
"ammonia"
"argon"
"butane"
"carbon dioxide"
"carbon monoxide"
"chlorine"
"ethane"
"ethylene"
"fluorine"
Tcrit
Pcrit
R = 8.
a = 27
b = R*
Z = ze
for i
Va
iticalValues.Gas == lower(gas),'Critical
iticalValues.Gas == lower(gas),'Criticall
rit);
%
-(b + R*T/P(i)) a/P(i) -a*b/P(i)];
script
Ln 5
Col 23



Zmena skriptu na aplikáciu

```
lastnames = ["Smith", "Johnson", "Williams",
"Jones", "Brown", "Davis", "Miller", "Wilson"];
```





C:\Demos\SunriseSunset.mlx

LIVE EDITOR INSERT VIEW

Estimating Sunrise and Sunset

We can estimate sunrise and sunset times if we know the latitude, longitude, and UTC offset. We need to calculate two values:

- Solar time correction
- Solar declination

The solar time correction is the difference (in minutes) between solar time and local time.

The solar declination (δ) is the angle of the sun relative to the earth's equatorial plane. On any given day of the year (d), solar declination (δ) can be calculated from the following formula:

$$\delta = \sin^{-1}\left[\sin(23.45)\sin\left(\frac{360}{365}(d-81)\right)\right]$$

Using the latitude (ϕ), the sun's declination (δ) and the solar time correction (SC) we can calculate sunrise and sunset times.

$$\text{sunrise} = 12 - \frac{\cos^{-1}(-\tan\phi\tan\delta)}{15^\circ} - \frac{SC}{60} \qquad \text{sunset} = 12 + \frac{\cos^{-1}(-\tan\phi\tan\delta)}{15^\circ} - \frac{SC}{60}$$

Estimating the Sunrise and Sunset Times

Set the latitude, longitude, and UT offset. Notice what happens to the sunrise and sunset times when the latitude is more than 66 degrees N or S (within the polar circles).

```
lat  =  42 ;
lon =  -71 ;
UTCoff = -5 ;
```

Estimate the sunrise and sunset times. We use the custom `equationOfTime` function to calculate the solar time correction (SC).

```
day = 1:365;
timeCorr = equationOfTime(day);
solarCorr = 4*(lon - 15*UTCoff) + timeCorr;
delta = asind(sind(23.45)*sind(360*(day - 81)/365));
sunrise = 12 - acosd(-tand(lat)*tand(delta))/15 - solarCorr/60;
```

C:\Demos\SunriseSunset_fonts.mlx

LIVE EDITOR INSERT VIEW

Estimating Sunrise and Sunset

We can estimate sunrise and sunset times if we know the latitude, longitude, and UTC offset. We need to calculate two values:

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- Solar declination

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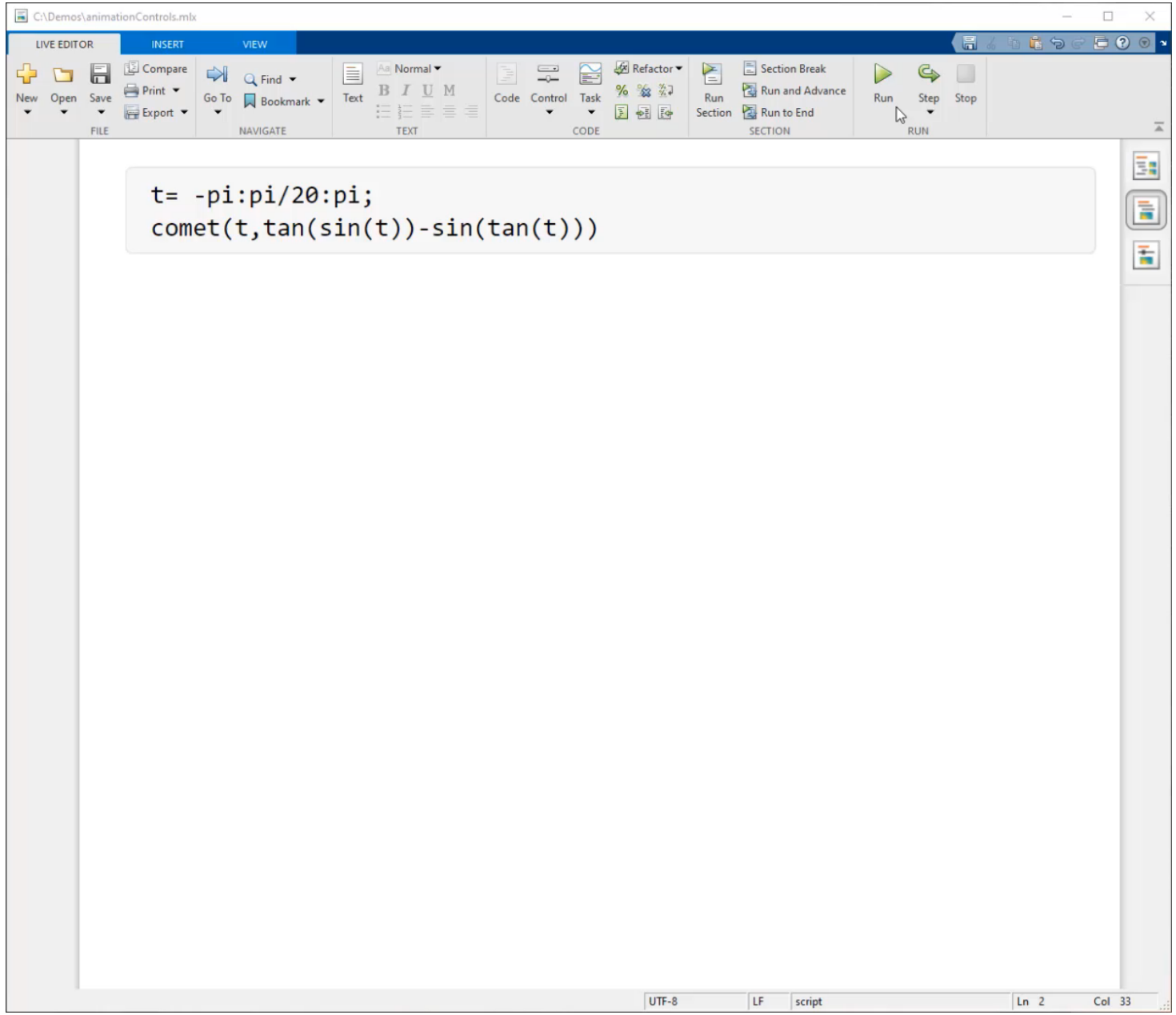
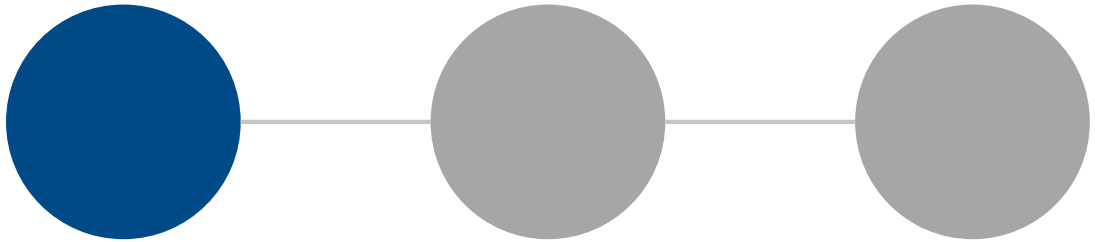
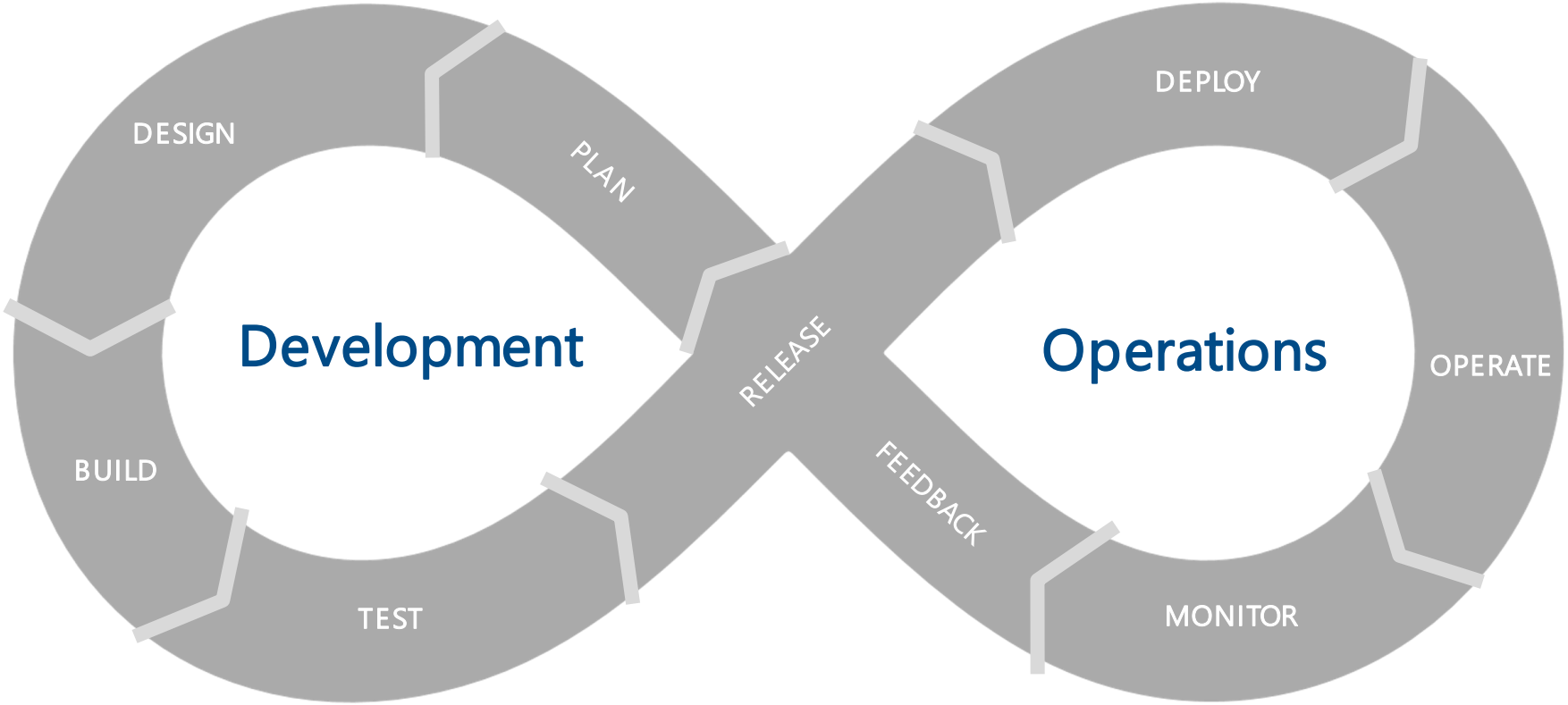

C:\Demos\animationControls.mlx
LIVE EDITOR
INSERT
VIEW
New
Open
Save
Compare
Print
Export
FILE
Go To
Find
Bookmark
NAVIGATE
Text
Normal
TEXT
Code
Control
Task
Refactor
CODE
Run Section
Section Break
Run and Advance
Run to End
SECTION
Run
Step
Stop
RUN
t= -pi:pi/20:pi;
comet(t,tan(sin(t))-sin(tan(t)))
UTF-8
LF
script
Ln 2
Col 33


Práca
Spolupráca
Produkcia


Práca
Spolupráca
Produkcia

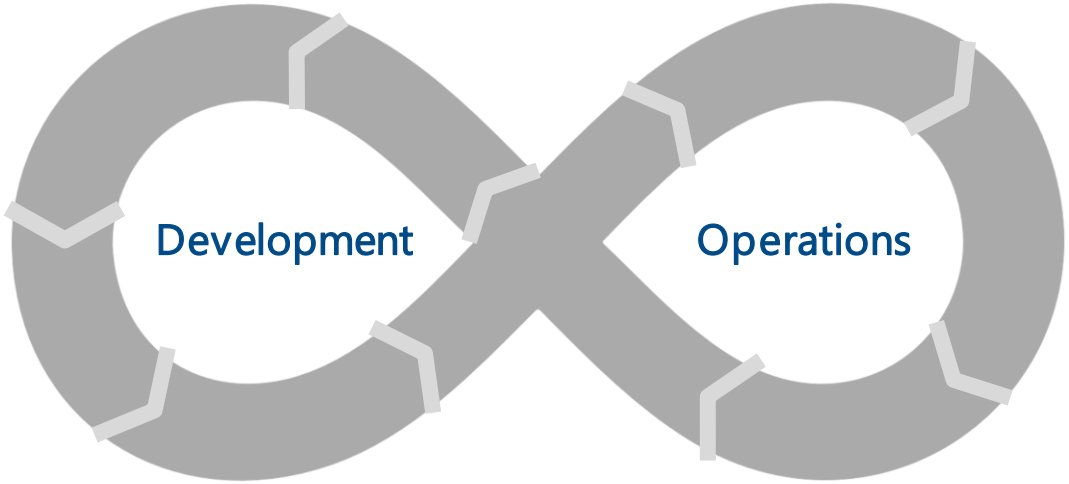

DESIGN
PLAN
DEPLOY
Development
RELEASE
Operations
OPERATE
BUILD
FEEDBACK
TEST
MONITOR

Jazyky

C/C++

Python

Java



Jazyky

C/C++

Python

Java

Správa verzií & CI

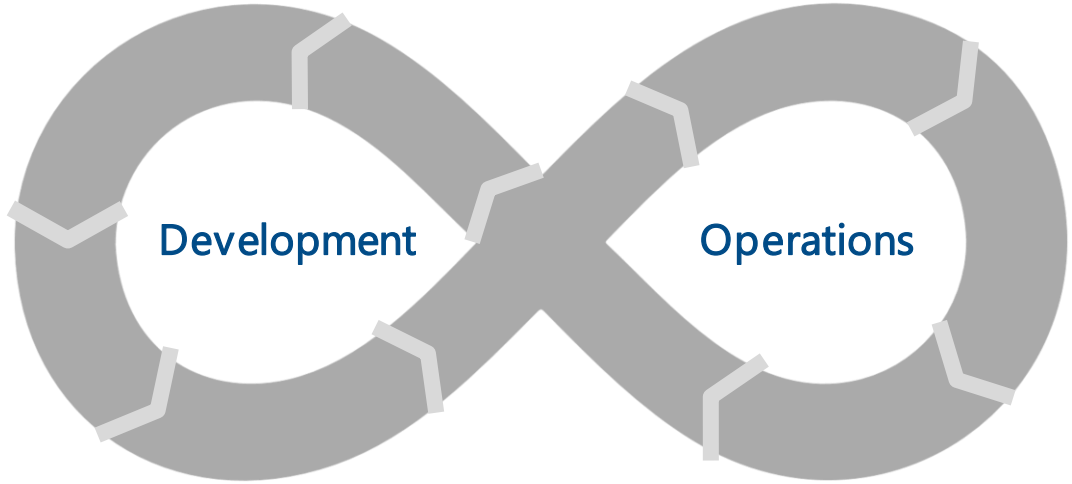
GitHub

Git

Jenkins

Travis CI

CircleCi



Jazyky

C/C++

Python

Java

Správa verzií & CI

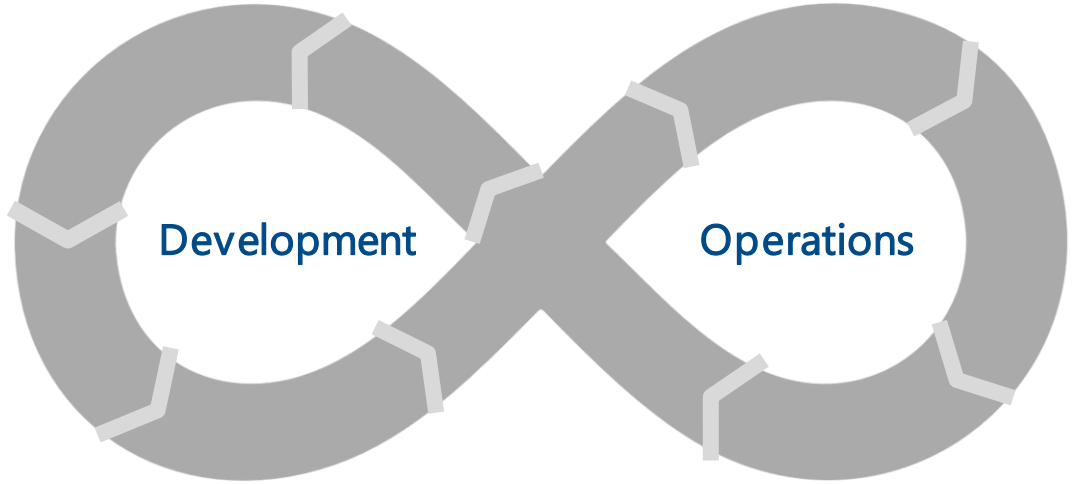
GitHub

Git

Jenkins

Travis CI

CircleCi



Cloud Platformy & Technológie

AWS

Azure

Docker

Docker Hub

Jazyky

C/C++

Python

Java

Správa verzií & CI

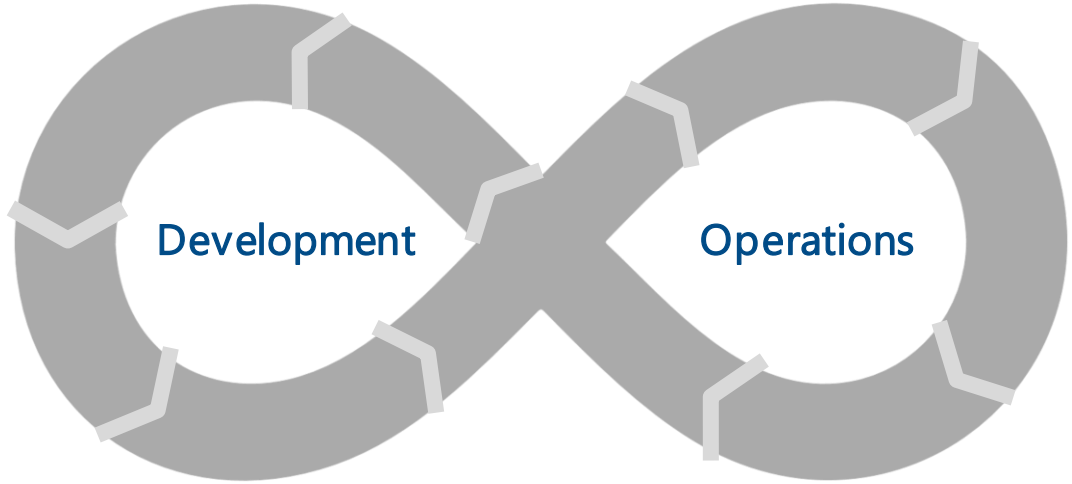
GitHub

Git

Jenkins

Travis CI

CircleCi



Dátové Platformy & Technológie

Domino Data Lab

Databricks

Jupyter

Tableau

Kafka

Hadoop

MQTT

RabbitMQ

Cloud Platformy & Technológie

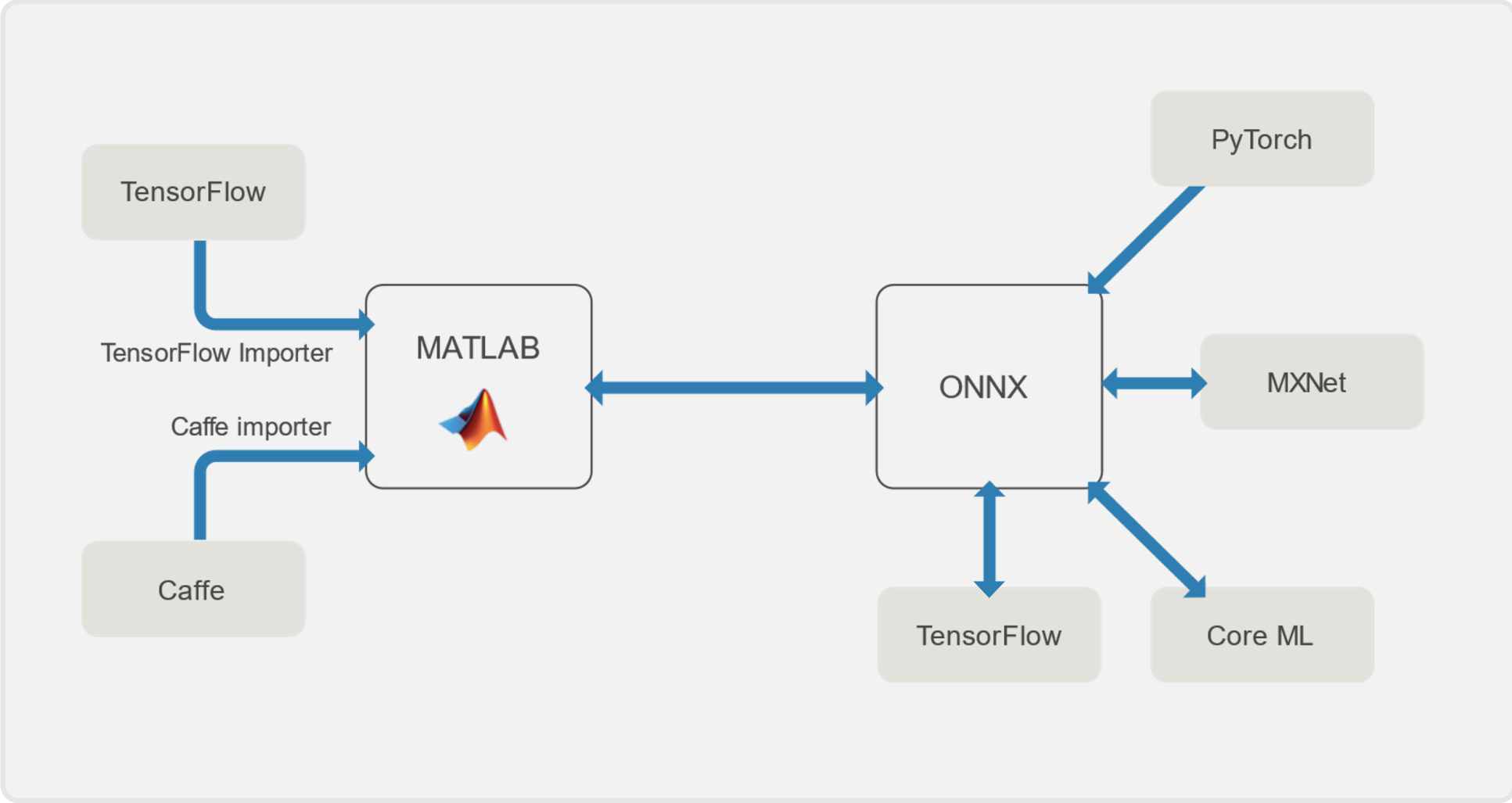
AWS

Azure

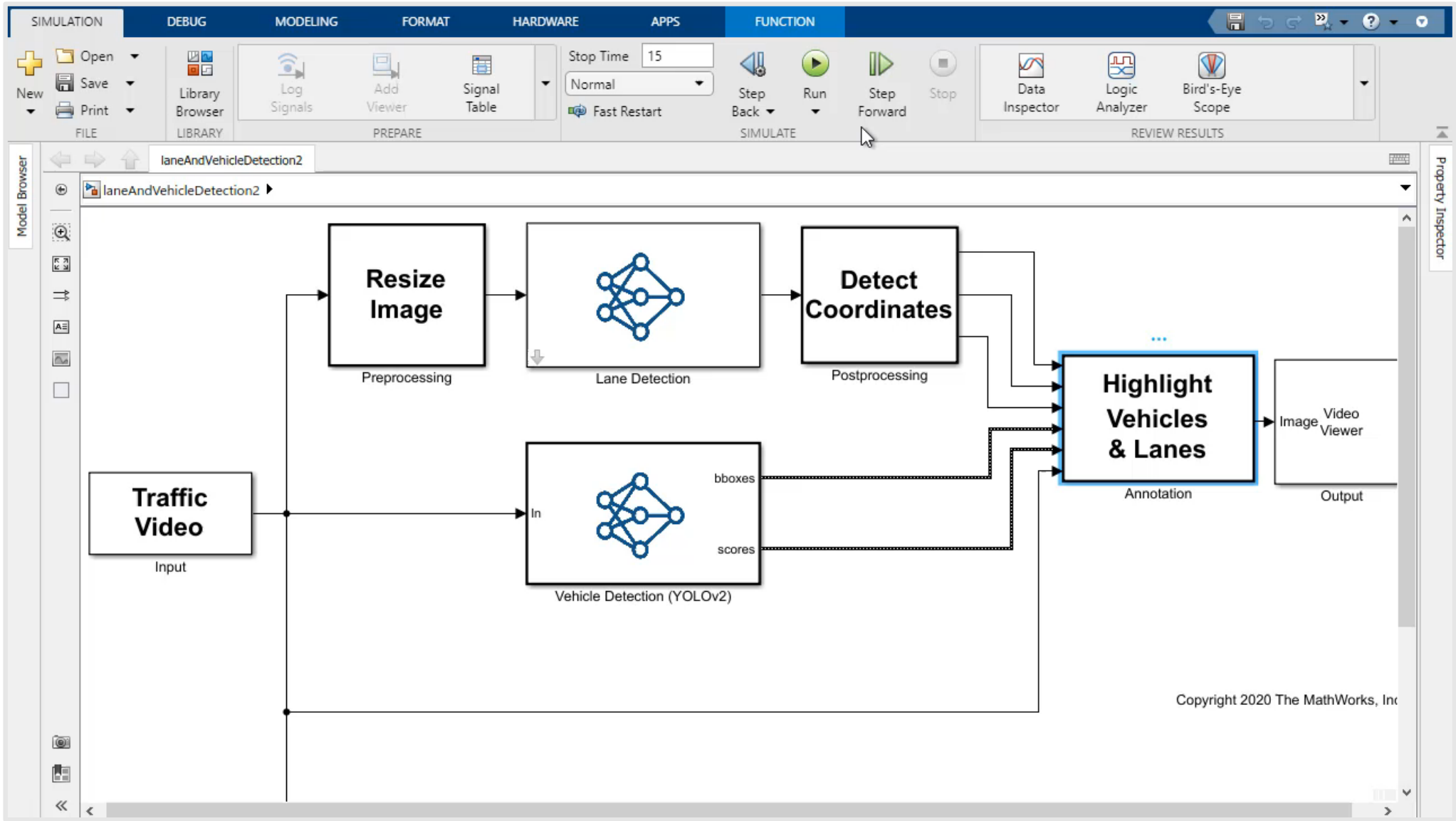
Docker

Docker Hub

Integrácia Pythonových frameworkov



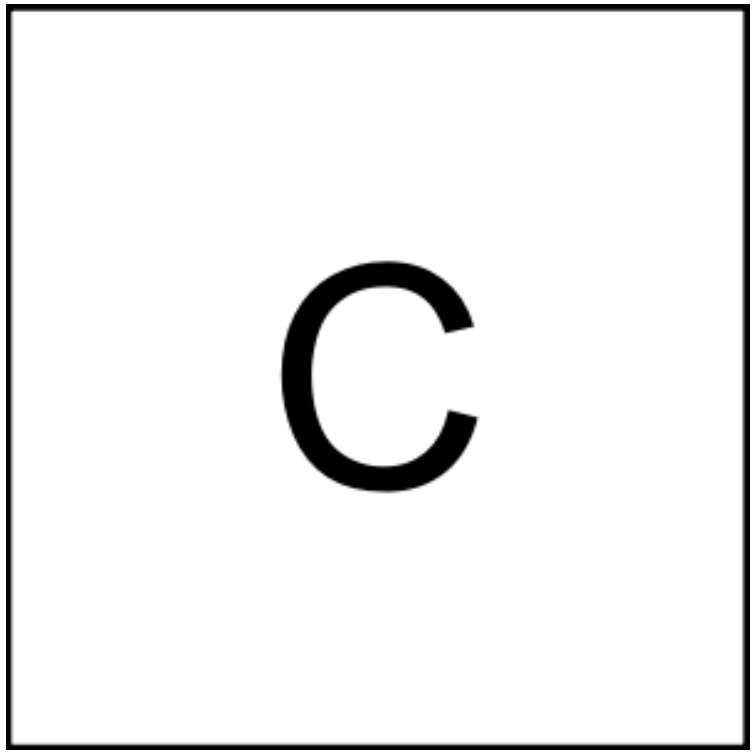
Deep Learning v Simulinku



Simulink ako integračná platforma

Integrácia C kódu do Simulinku

R2020a



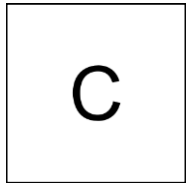
C Function

R2018b

C Caller

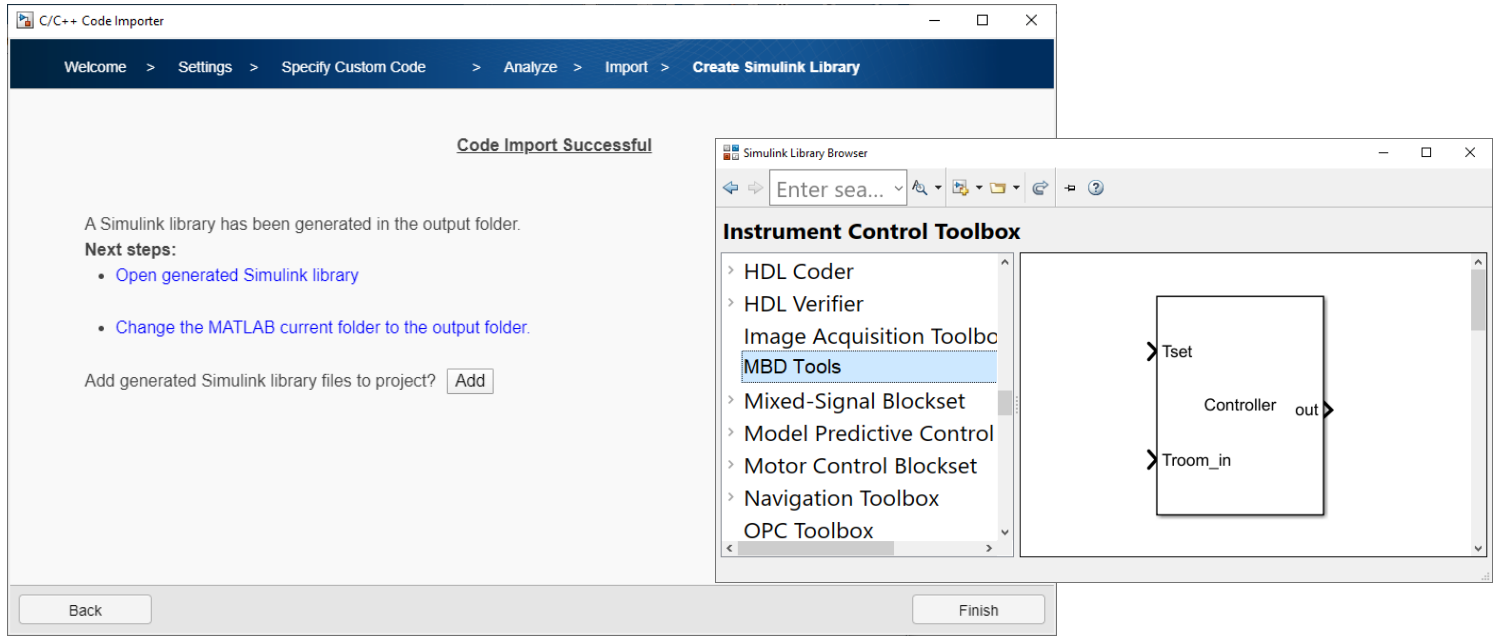
- Simulink Coverage
- Simulink Test
- Simulink Design Verifier
- Simulink Coder

R2020a



C Function

R2021a



Code Importer

R2018b

<FunctionName>

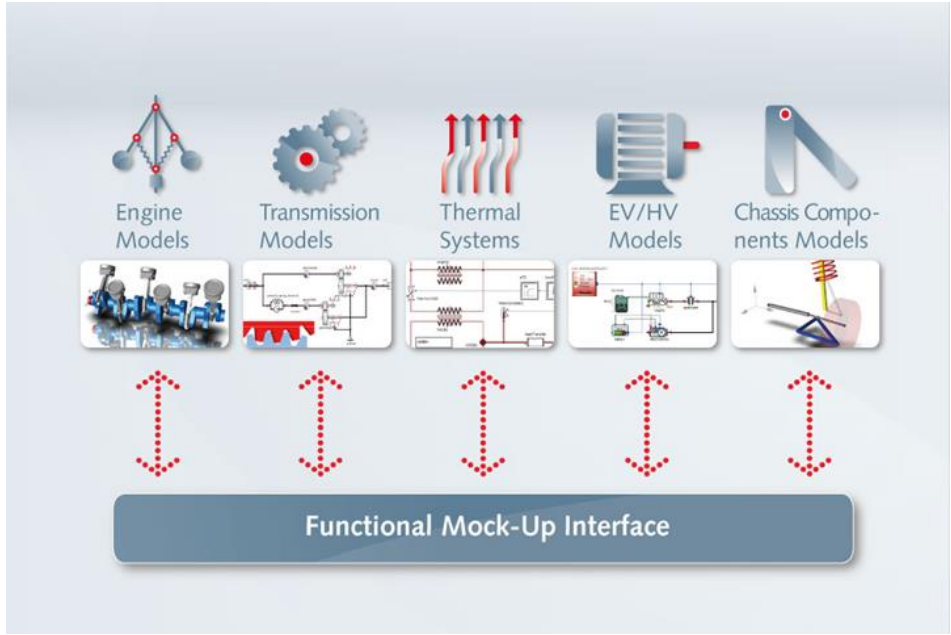
C Caller

R2020a

C

C Function

Flexibilita simulácie a kosimulácie



FMU Import a Export

R2018b R2020a R2021a

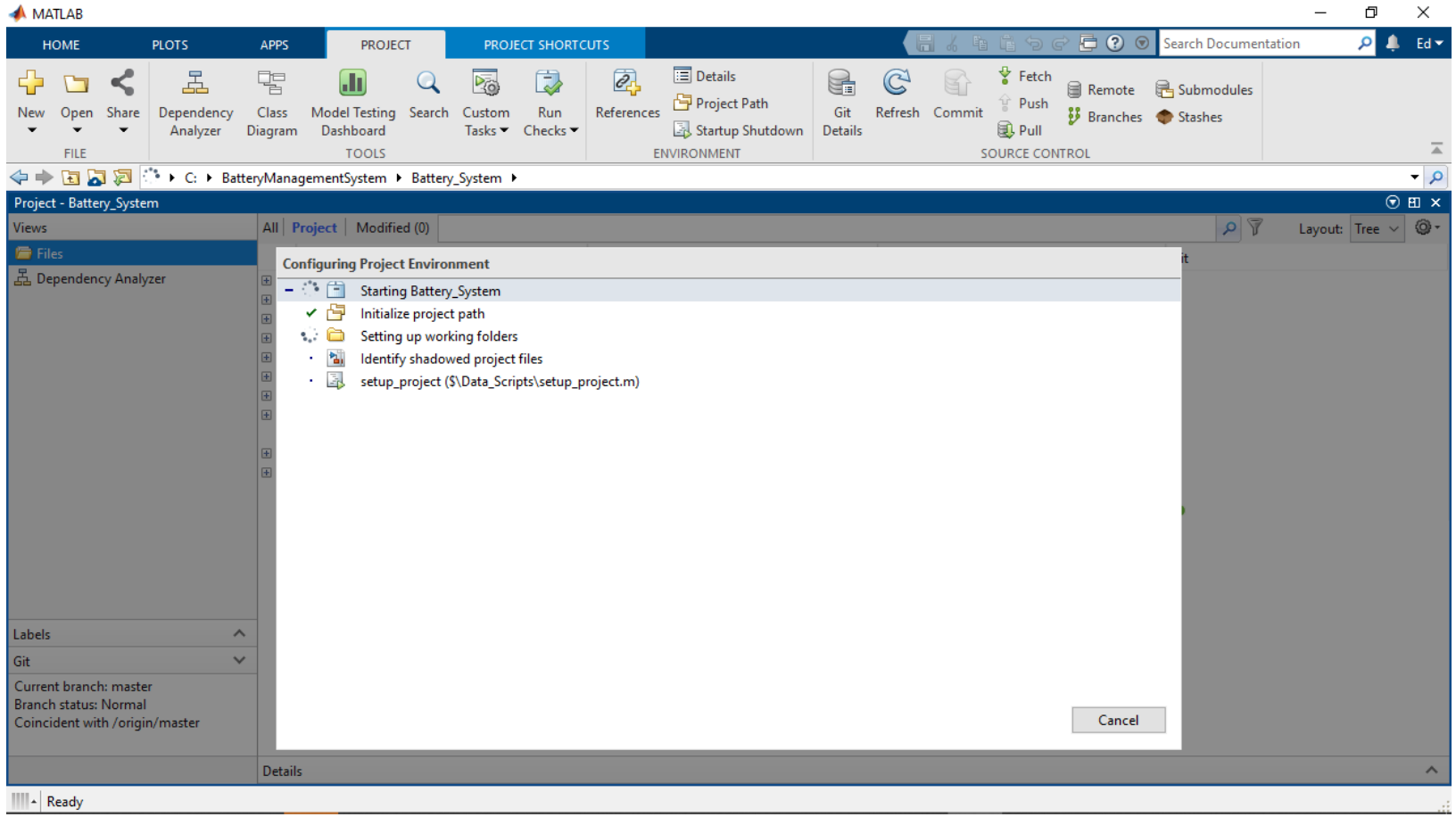
<FunctionName>

C

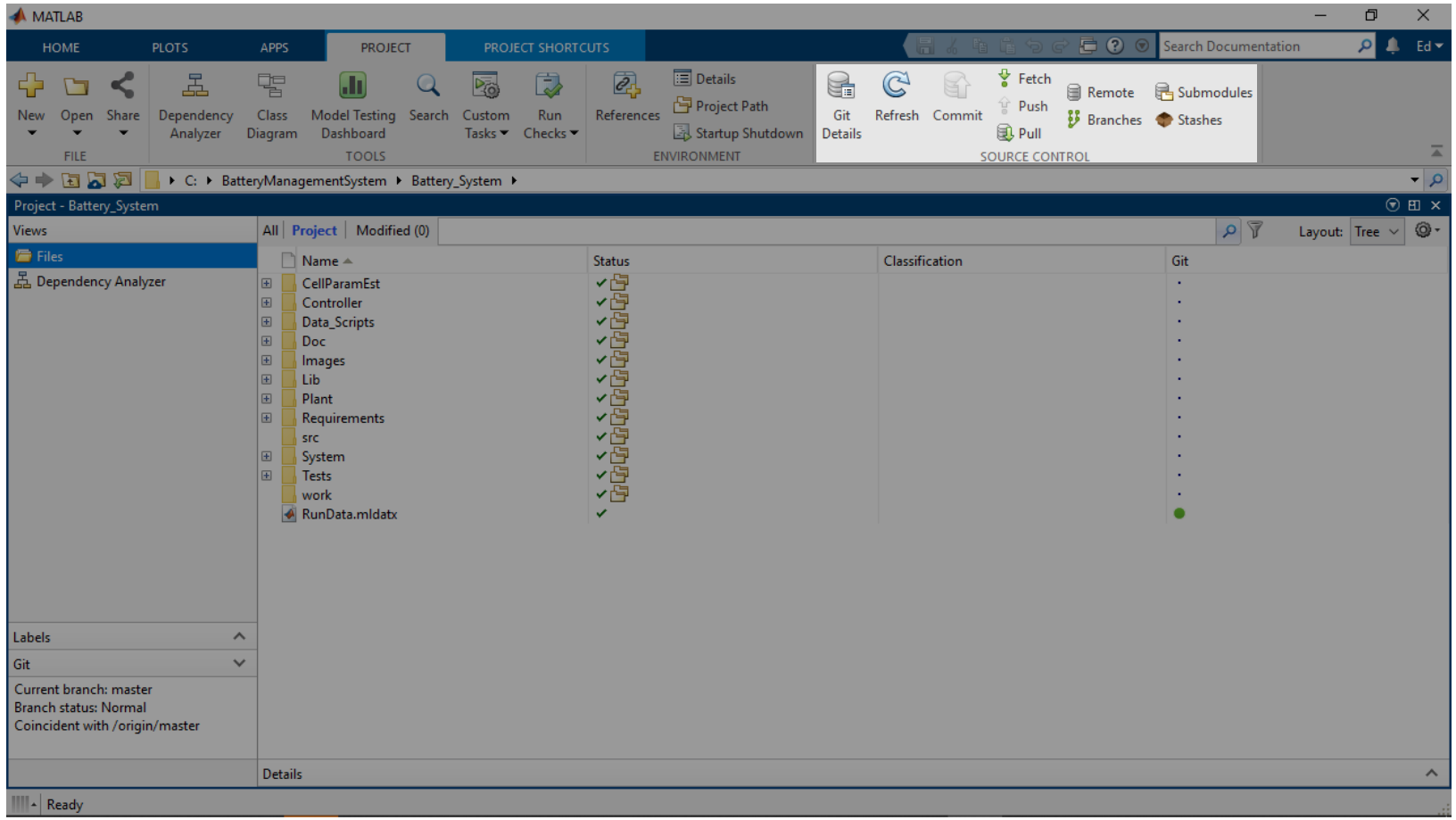
C Caller C Function Code Importer


Environment Setup and Automation
Dependency and Impact Analysis
Source Control Integration
Componentized Development
Sharing and Deployment
Testing and Verification
Projects
MATLAB® & SIMULINK®


Environment Setup and Automation
Testing and Verification
Dependency and Impact Analysis
Projects
MATLAB® & SIMULINK®
Sharing and Deployment
Source Control Integration
Componentized Development


MATLAB
HOME
PLOTS
APPS
PROJECT
PROJECT SHORTCUTS
Search Documentation
Ed
New
Open
Share
Dependency Analyzer
Class Diagram
Model Testing Dashboard
Search
Custom Tasks
Run Checks
References
Details
Project Path
Startup Shutdown
Git Details
Refresh
Commit
Fetch
Push
Pull
Remote
Branches
Submodules
Stashes
FILE
TOOLS
ENVIRONMENT
SOURCE CONTROL
C: ▸ BatteryManagementSystem ▸ Battery_System ▸
Project - Battery_System
Views
Files
Dependency Analyzer
All
Project
Modified (0)
Layout:
Tree
Configuring Project Environment
Starting Battery_System
Initialize project path
Setting up working folders
Identify shadowed project files
setup_project ($\Data_Scripts\setup_project.m)
Cancel
Labels
Git
Current branch: master
Branch status: Normal
Coincident with /origin/master
Details
Ready


Environment Setup and Automation
Testing and Verification
Dependency and Impact Analysis
Projects
MATLAB® & SIMULINK®
Sharing and Deployment
Source Control Integration
Componentized Development


MATLAB
HOME
PLOTS
APPS
PROJECT
PROJECT SHORTCUTS
Search Documentation
Ed
New
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Share
Dependency Analyzer
Class Diagram
Model Testing Dashboard
Search
Custom Tasks
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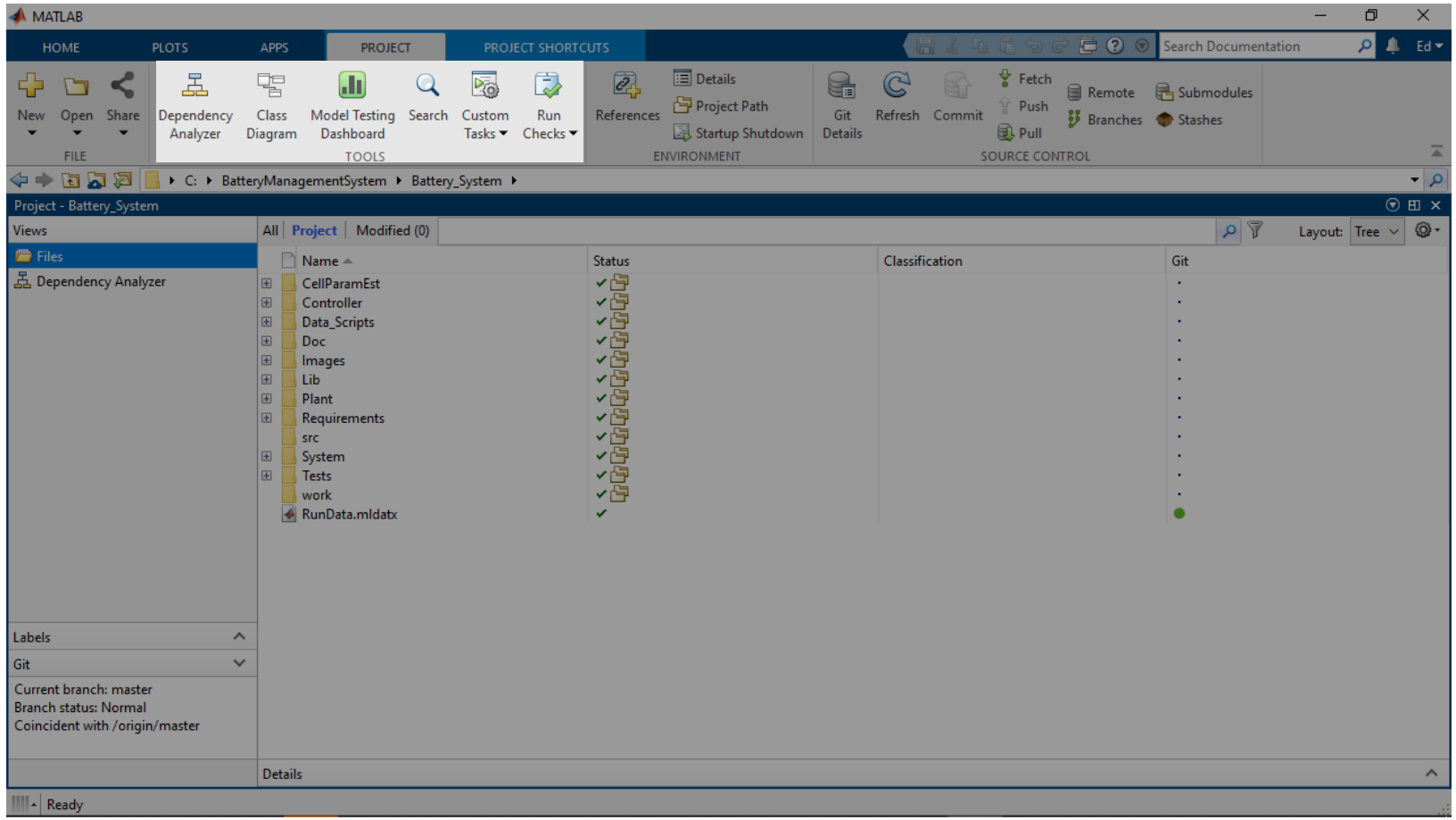
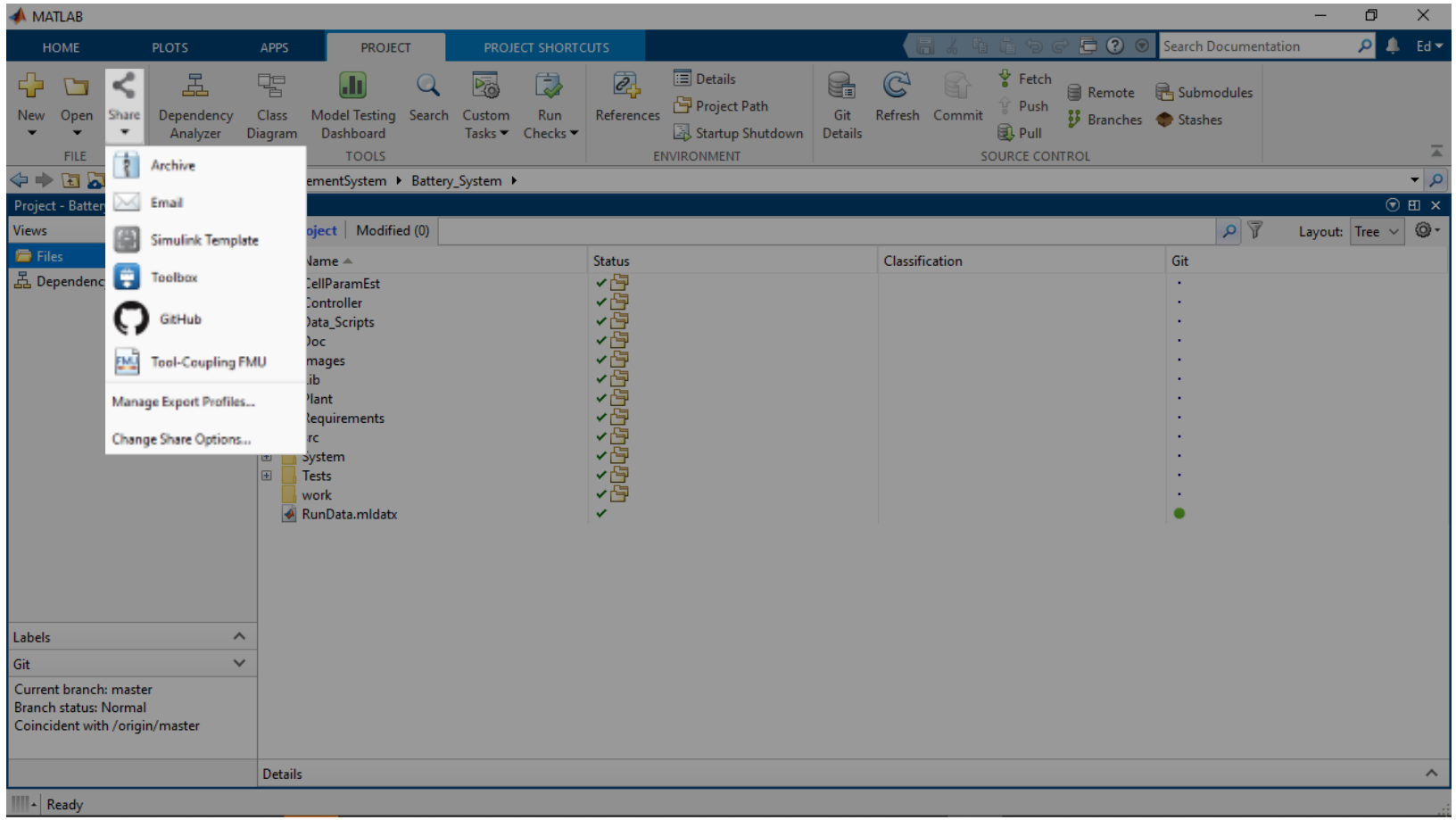
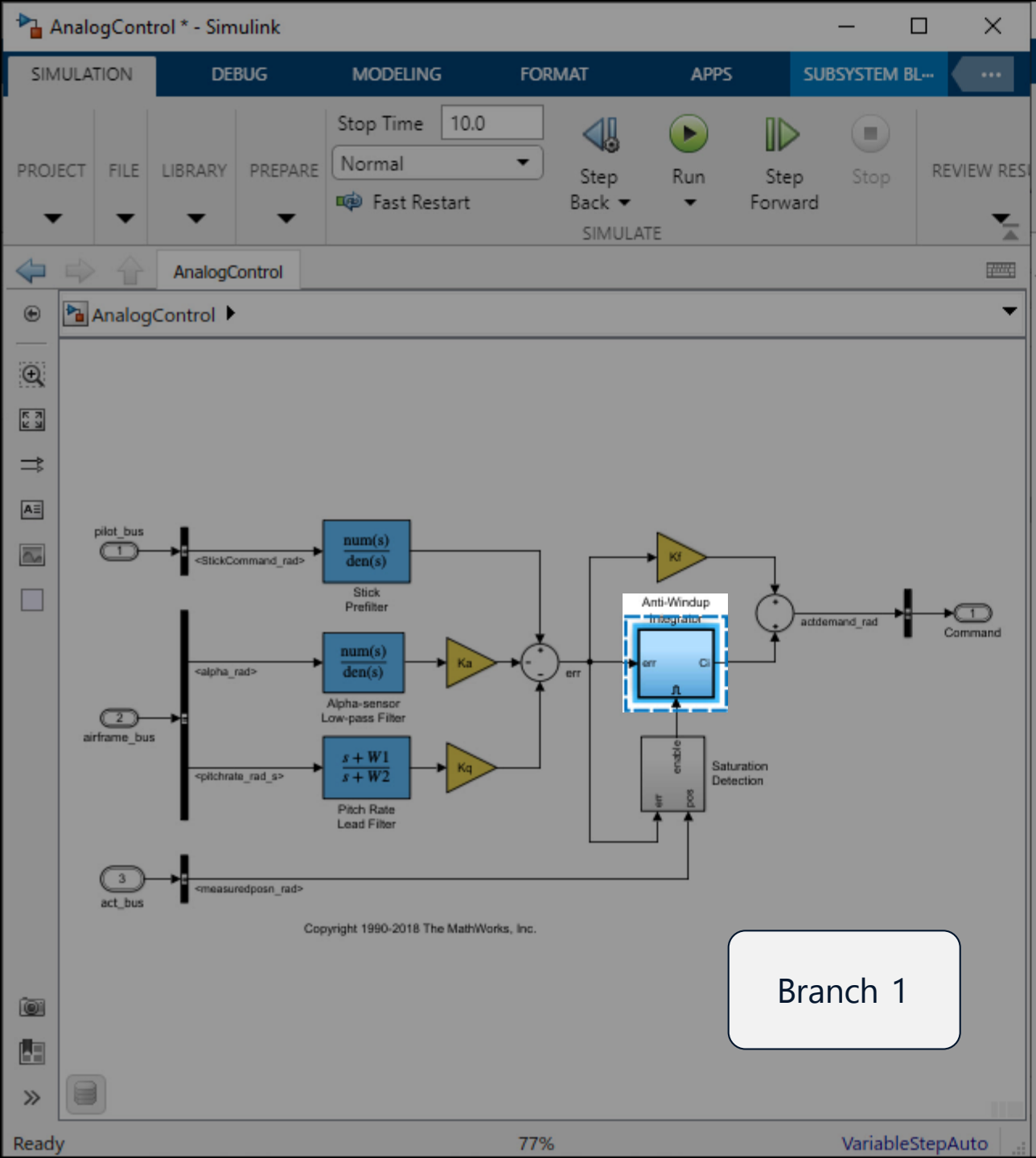
Startup Shutdown
Git Details
Refresh
Commit
Fetch
Push
Pull
Remote
Branches
Submodules
Stashes
FILE
TOOLS
ENVIRONMENT
SOURCE CONTROL
C: ▸ BatteryManagementSystem ▸ Battery_System ▸
Project - Battery_System
Views
Files
Dependency Analyzer
All
Project
Modified (0)
Layout:
Tree
Name
Status
Classification
Git
CellParamEst
Controller
Data_Scripts
Doc
Images
Lib
Plant
Requirements
src
System
Tests
work
RunData.mldatx
Labels
Git
Current branch: master
Branch status: Normal
Coincident with /origin/master
Details
Ready

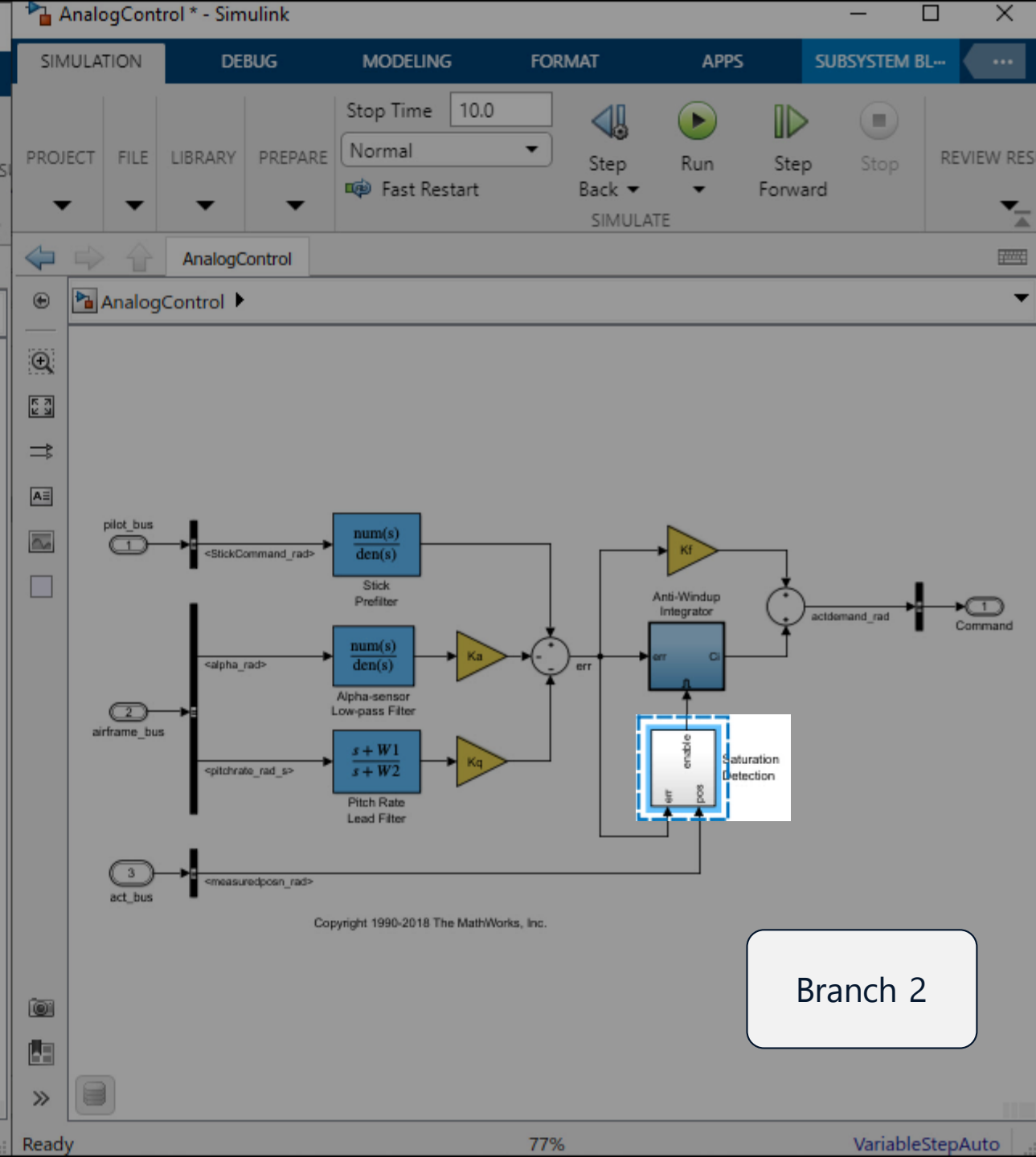

Environment Setup and Automation
Testing and Verification
Dependency and Impact Analysis
Projects
MATLAB & SIMULINK
Sharing and Deployment
Source Control Integration
Componentized Development

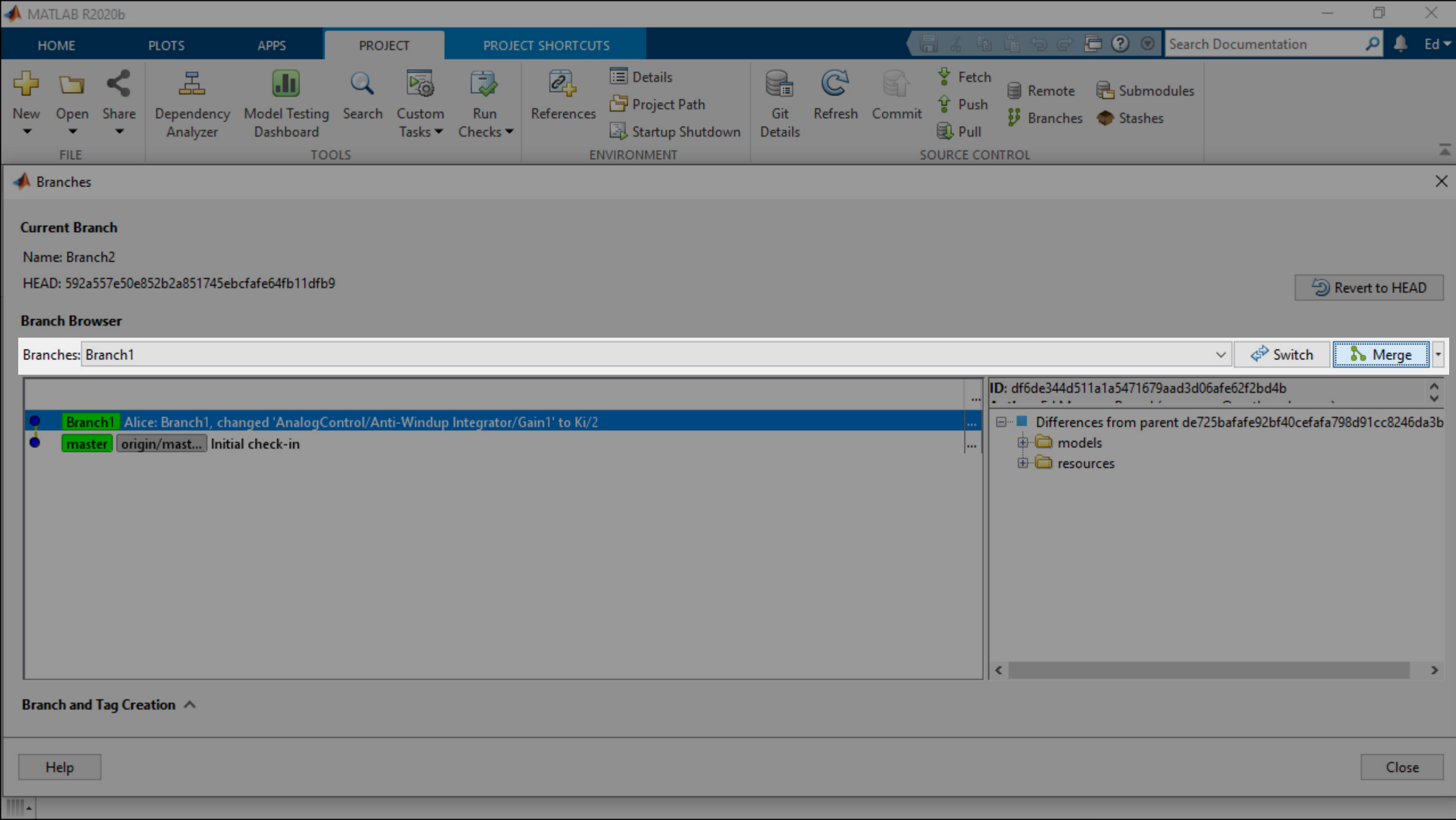

MATLAB
HOME
PLOTS
APPS
PROJECT
PROJECT SHORTCUTS
Search Documentation
Ed
New
Open
Share
FILE
Dependency Analyzer
Class Diagram
Model Testing Dashboard
Search
Custom Tasks
Run Checks
TOOLS
References
Details
Project Path
Startup Shutdown
ENVIRONMENT
Git Details
Refresh
Commit
Fetch
Push
Pull
Remote
Branches
Submodules
Stashes
SOURCE CONTROL
C: ▸ BatteryManagementSystem ▸ Battery_System ▸
Project - Battery_System
Views
Files
Dependency Analyzer
All
Project
Modified (0)
Layout:
Tree
Name
Status
Classification
Git
CellParamEst
Controller
Data_Scripts
Doc
Images
Lib
Plant
Requirements
src
System
Tests
work
RunData.mldatx
Labels
Git
Current branch: master
Branch status: Normal
Coincident with /origin/master
Details
Ready

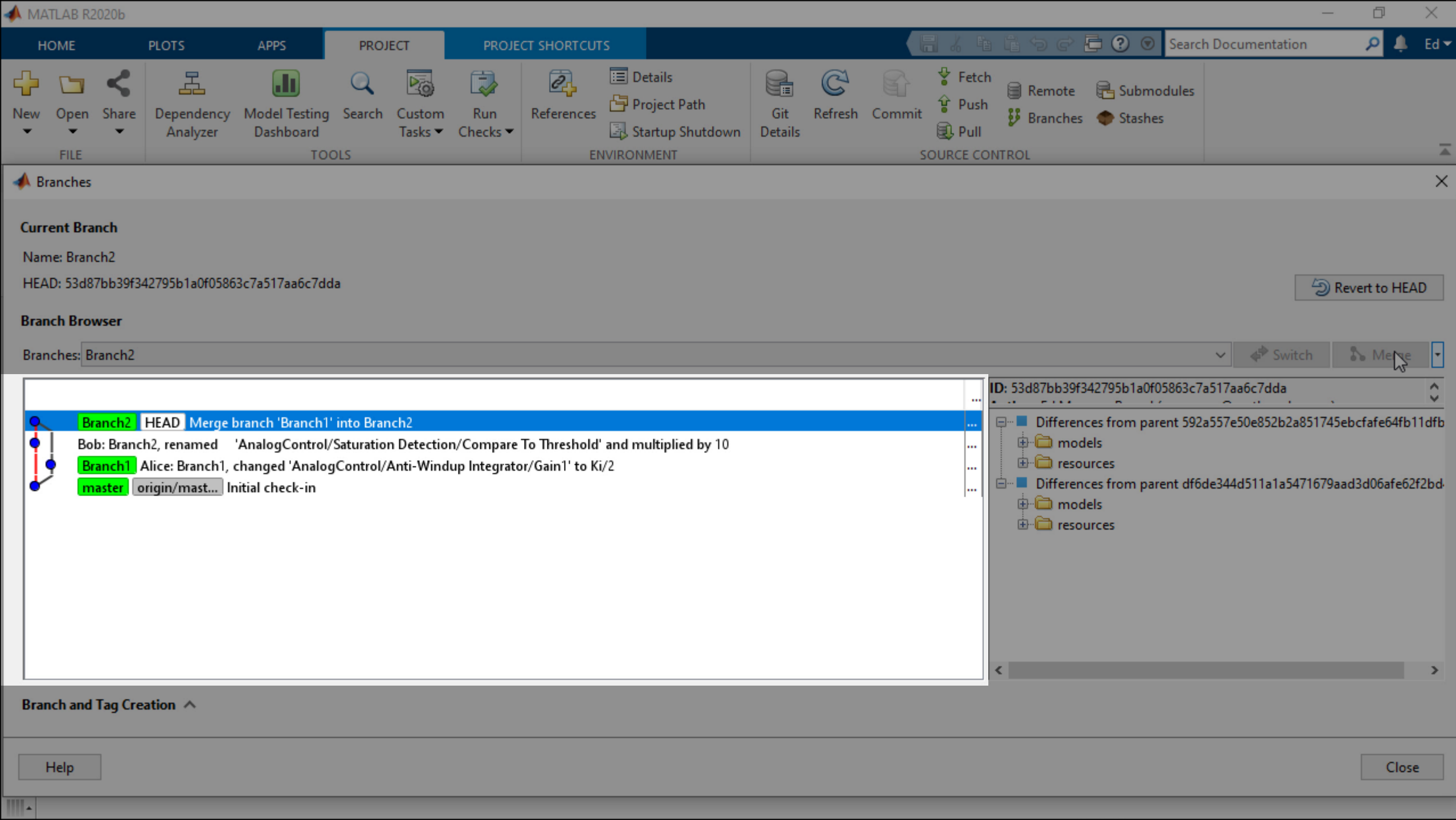

Environment Setup and Automation
Testing and Verification
Dependency and Impact Analysis
Projects
MATLAB & SIMULINK
Sharing and Deployment
Source Control Integration
Componentized Development


MATLAB
HOME
PLOTS
APPS
PROJECT
PROJECT SHORTCUTS
Search Documentation
New
Open
Share
Dependency Analyzer
Class Diagram
Model Testing Dashboard
Search
Custom Tasks
Run Checks
References
Details
Project Path
Startup Shutdown
Git Details
Refresh
Commit
Fetch
Push
Pull
Remote
Branches
Submodules
Stashes
FILE
TOOLS
ENVIRONMENT
SOURCE CONTROL
Archive
Email
Simulink Template
Toolbox
GitHub
Tool-Coupling FMU
Manage Export Profiles...
Change Share Options...
Battery_System
Views
Files
Modified (0)
Layout:
Tree
Status
Classification
Git
RunData.mldatx
Labels
Git
Current branch: master
Branch status: Normal
Coincident with /origin/master
Details
Ready


AnalogControl * - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
SUBSYSTEM BL...
PROJECT
FILE
LIBRARY
PREPARE
Stop Time
10.0
Normal
Fast Restart
Step Back
Run
Step Forward
Stop
SIMULATE
REVIEW RESU
AnalogControl
pilot_bus
<StickCommand_rad>
num(s)
den(s)
Stick Prefilter
<alpha_rad>
Alpha-sensor Low-pass Filter
airframe_bus
<pitchrate_rad_s>
s + W1
s + W2
Pitch Rate Lead Filter
Kf
Ka
Kq
err
Anti-Windup Integrator
Ci
enable
pos
Saturation Detection
actdemand_rad
Command
act_bus
<measuredposn_rad>
Copyright 1990-2018 The MathWorks, Inc.
Branch 1
Ready
77%
VariableStepAuto


AnalogControl * - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
SUBSYSTEM BL...
PROJECT
FILE
LIBRARY
PREPARE
Stop Time
10.0
Normal
Fast Restart
Step Back
Run
Step Forward
Stop
SIMULATE
REVIEW RES
AnalogControl
pilot_bus
<StickCommand_rad>
num(s)
den(s)
Stick Prefilter
<alpha_rad>
Alpha-sensor Low-pass Filter
airframe_bus
<pitchrate_rad_s>
s + W1
s + W2
Pitch Rate Lead Filter
Kf
Ka
Kq
err
Anti-Windup Integrator
Ci
enable
pos
Saturation Detection
actdemand_rad
Command
act_bus
<measuredposn_rad>
Copyright 1990-2018 The MathWorks, Inc.
Branch 2
Ready
77%
VariableStepAuto


MATLAB R2020b
HOME
PLOTS
APPS
PROJECT
PROJECT SHORTCUTS
Search Documentation
Ed
New
Open
Share
FILE
Dependency Analyzer
Model Testing Dashboard
Search
Custom Tasks
Run Checks
TOOLS
References
Details
Project Path
Startup Shutdown
ENVIRONMENT
Git Details
Refresh
Commit
Fetch
Push
Pull
Remote
Branches
Submodules
Stashes
SOURCE CONTROL
Branches
Current Branch
Name: Branch2
HEAD: 592a557e50e852b2a851745ebcfafe64fb11dfb9
Revert to HEAD
Branch Browser
Branches: Branch1
Switch
Merge
Branch1 Alice: Branch1, changed 'AnalogControl/Anti-Windup Integrator/Gain1' to Ki/2
master origin/mast... Initial check-in
ID: df6de344d511a1a5471679aad3d06afe62f2bd4b
Differences from parent de725bafafe92bf40cefafa798d91cc8246da3b
models
resources
Branch and Tag Creation
Help
Close


MATLAB R2020b
HOME
PLOTS
APPS
PROJECT
PROJECT SHORTCUTS
Search Documentation
Ed
New
Open
Share
FILE
Dependency Analyzer
Model Testing Dashboard
Search
Custom Tasks
Run Checks
TOOLS
References
Details
Project Path
Startup Shutdown
ENVIRONMENT
Git Details
Refresh
Commit
Fetch
Push
Pull
Remote
Branches
Submodules
Stashes
SOURCE CONTROL
Branches
Current Branch
Name: Branch2
HEAD: 53d87bb39f342795b1a0f05863c7a517aa6c7dda
Revert to HEAD
Branch Browser
Branches: Branch2
Switch
Merge
Branch2 HEAD Merge branch 'Branch1' into Branch2
Bob: Branch2, renamed 'AnalogControl/Saturation Detection/Compare To Threshold' and multiplied by 10
Branch1 Alice: Branch1, changed 'AnalogControl/Anti-Windup Integrator/Gain1' to Ki/2
master origin/mast... Initial check-in
ID: 53d87bb39f342795b1a0f05863c7a517aa6c7dda
Differences from parent 592a557e50e852b2a851745ebcfafe64fb11dfb
models
resources
Differences from parent df6de344d511a1a5471679aad3d06afe62f2bd
models
resources
Branch and Tag Creation
Help
Close

Dependency Analyzer - Battery_System

ANALYZER

Analyze | Restore to Default | MATLAB Files | Class Hierarchy | Model Hierarchy | All Dependencies | Impacted | Required | Horizontal | Vertical | Fit to View | Zoom In | Zoom Out | File List | Find | Project | Export

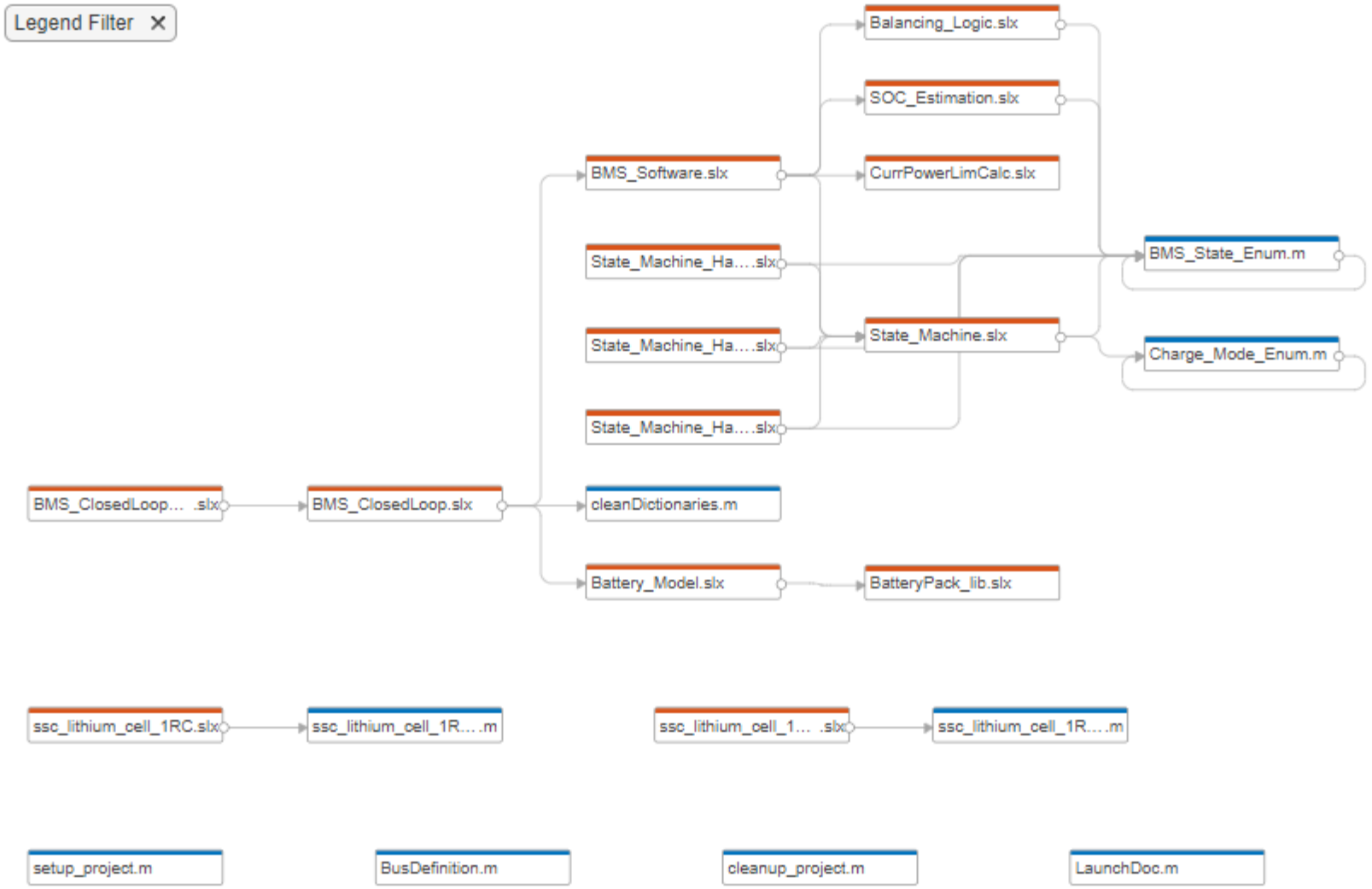
ANALYZE | VIEWS | IMPACT ANALYSIS | LAYOUT | NAVIGATE | SHOW | FIND | EXPORT

Legend

- [x] MATLAB Code (9 of 9)
- [x] Simulink Models and Libraries (14 of 14)
- [ ] Data (0 of 16)
- [ ] Requirements (0 of 11)
- [ ] Other Files (0 of 36)

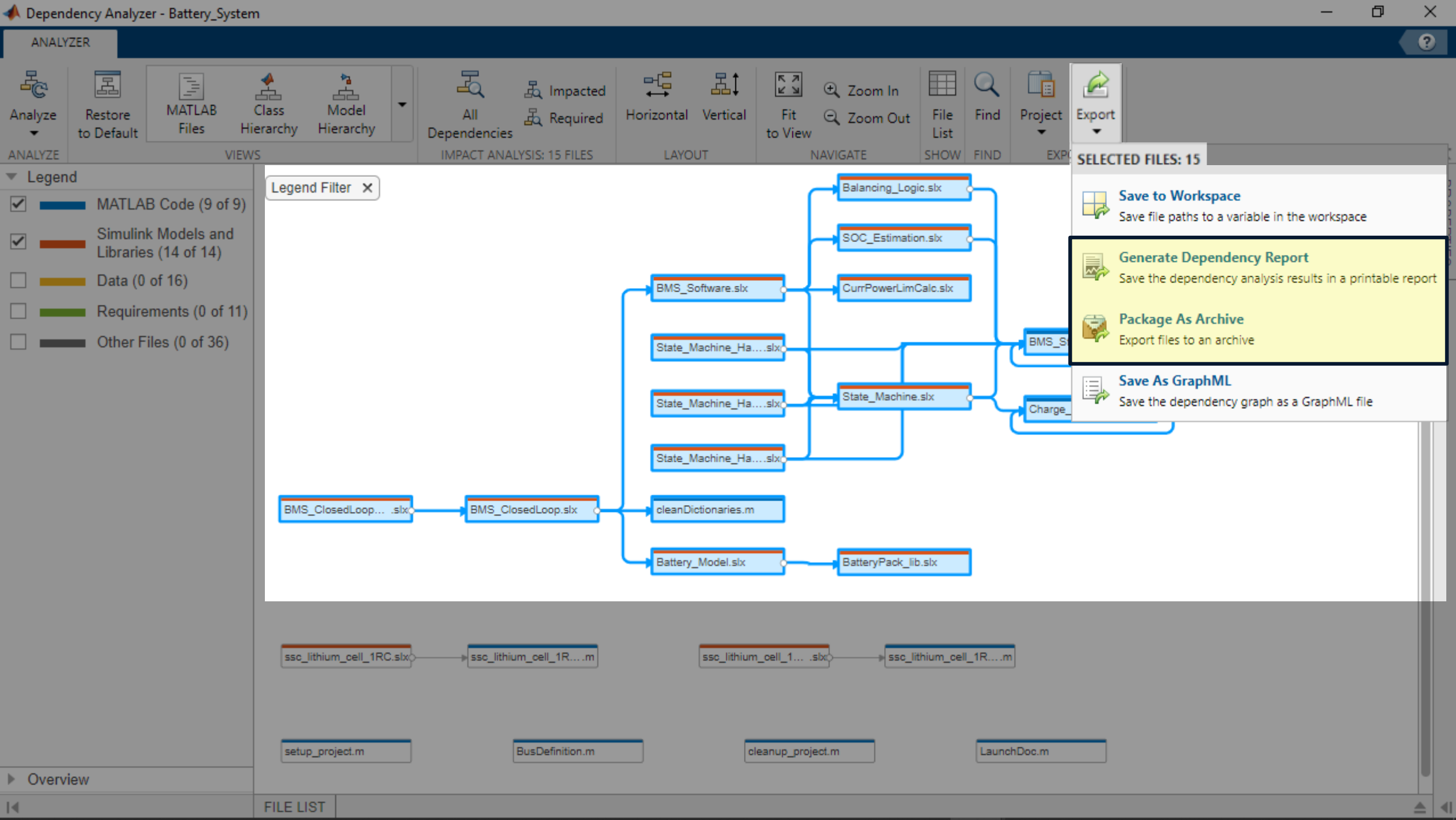
Overview

Legend Filter ×



PROPERTIES

FILE LIST


Dependency Analyzer - Battery_System
ANALYZER
Analyze
Restore to Default
MATLAB Files
Class Hierarchy
Model Hierarchy
All Dependencies
Impacted
Required
Horizontal
Vertical
Fit to View
Zoom In
Zoom Out
File List
Find
Project
Export
ANALYZE
VIEWS
IMPACT ANALYSIS: 15 FILES
LAYOUT
NAVIGATE
SHOW
FIND
SELECTED FILES: 15
Save to Workspace
Save file paths to a variable in the workspace
Generate Dependency Report
Save the dependency analysis results in a printable report
Package As Archive
Export files to an archive
Save As GraphML
Save the dependency graph as a GraphML file
Legend
MATLAB Code (9 of 9)
Simulink Models and Libraries (14 of 14)
Data (0 of 16)
Requirements (0 of 11)
Other Files (0 of 36)
Legend Filter
Balancing_Logic.slx
SOC_Estimation.slx
BMS_Software.slx
CurrPowerLimCalc.slx
State_Machine_Ha....slx
State_Machine_Ha....slx
State_Machine_Ha....slx
State_Machine.slx
BMS_ClosedLoop... .slx
BMS_ClosedLoop.slx
cleanDictionaries.m
Battery_Model.slx
BatteryPack_lib.slx
ssc_lithium_cell_1RC.slx
ssc_lithium_cell_1R....m
ssc_lithium_cell_1... .slx
ssc_lithium_cell_1R....m
setup_project.m
BusDefinition.m
cleanup_project.m
LaunchDoc.m
Overview
FILE LIST

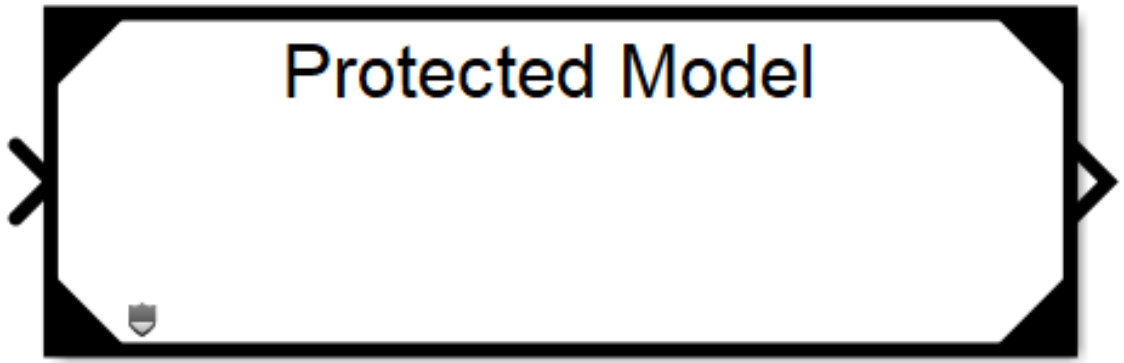
`Simulink.exportToVersion(a,b,c)`

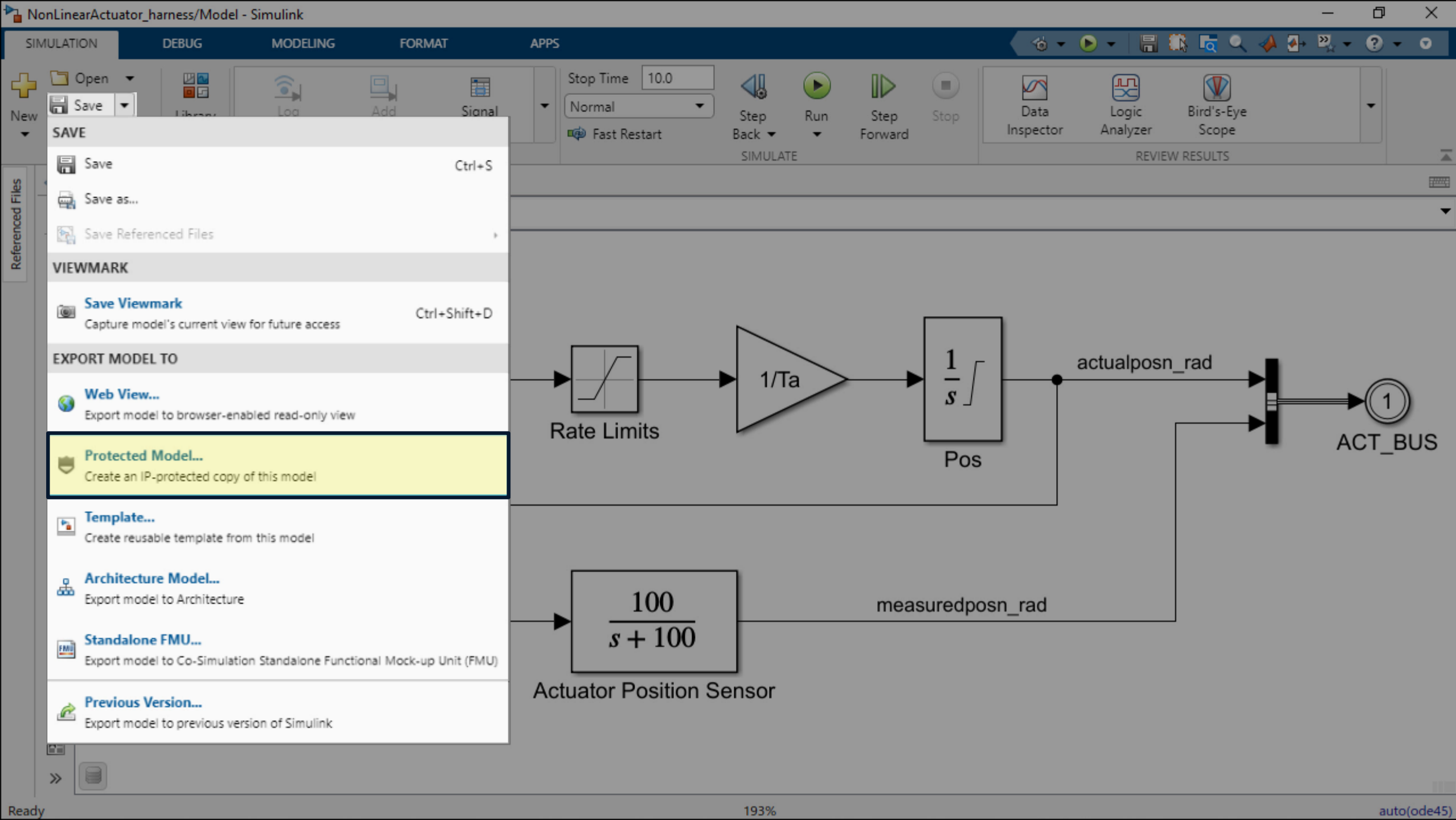
Projekt na export

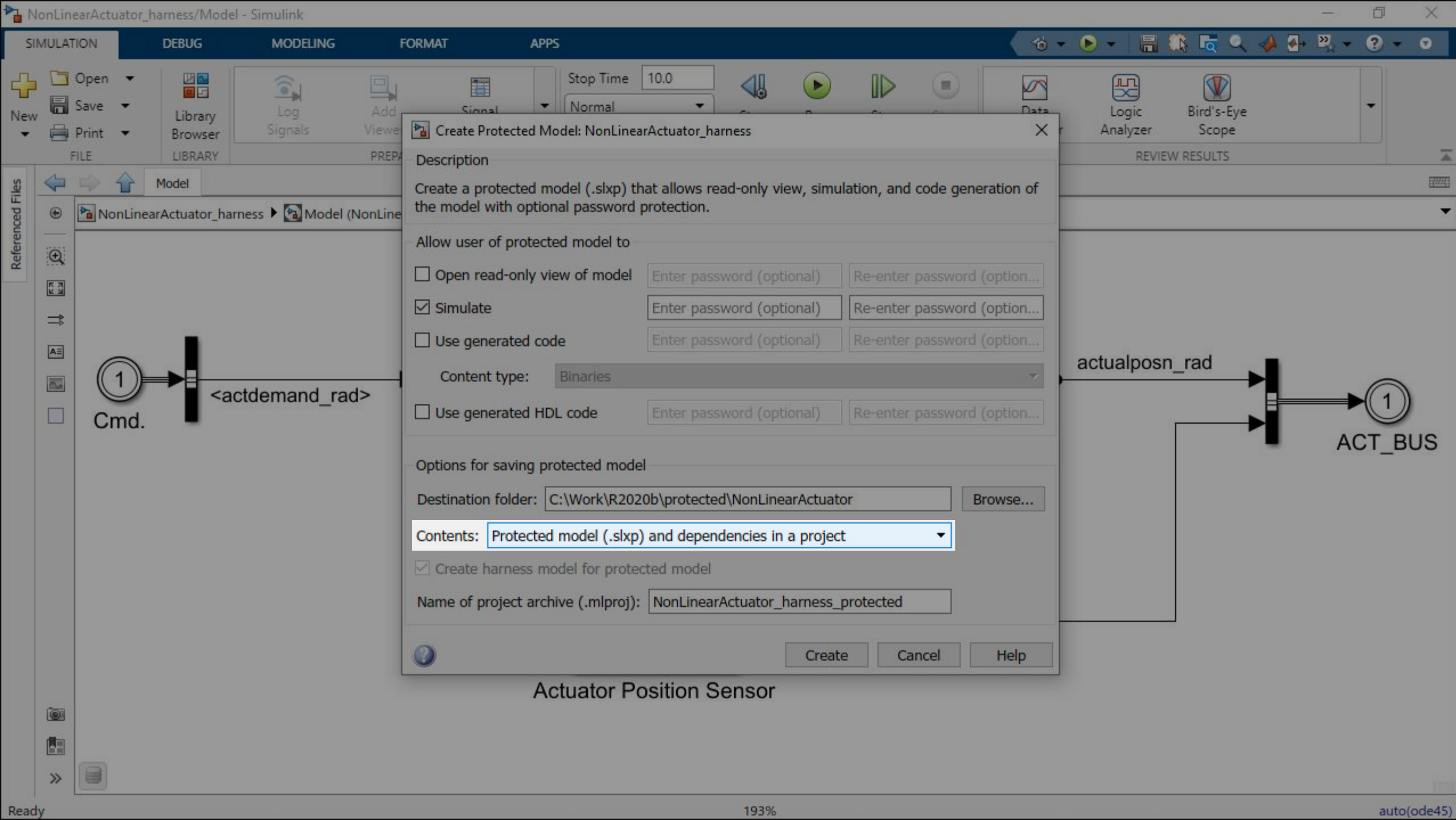
ZIP súbor

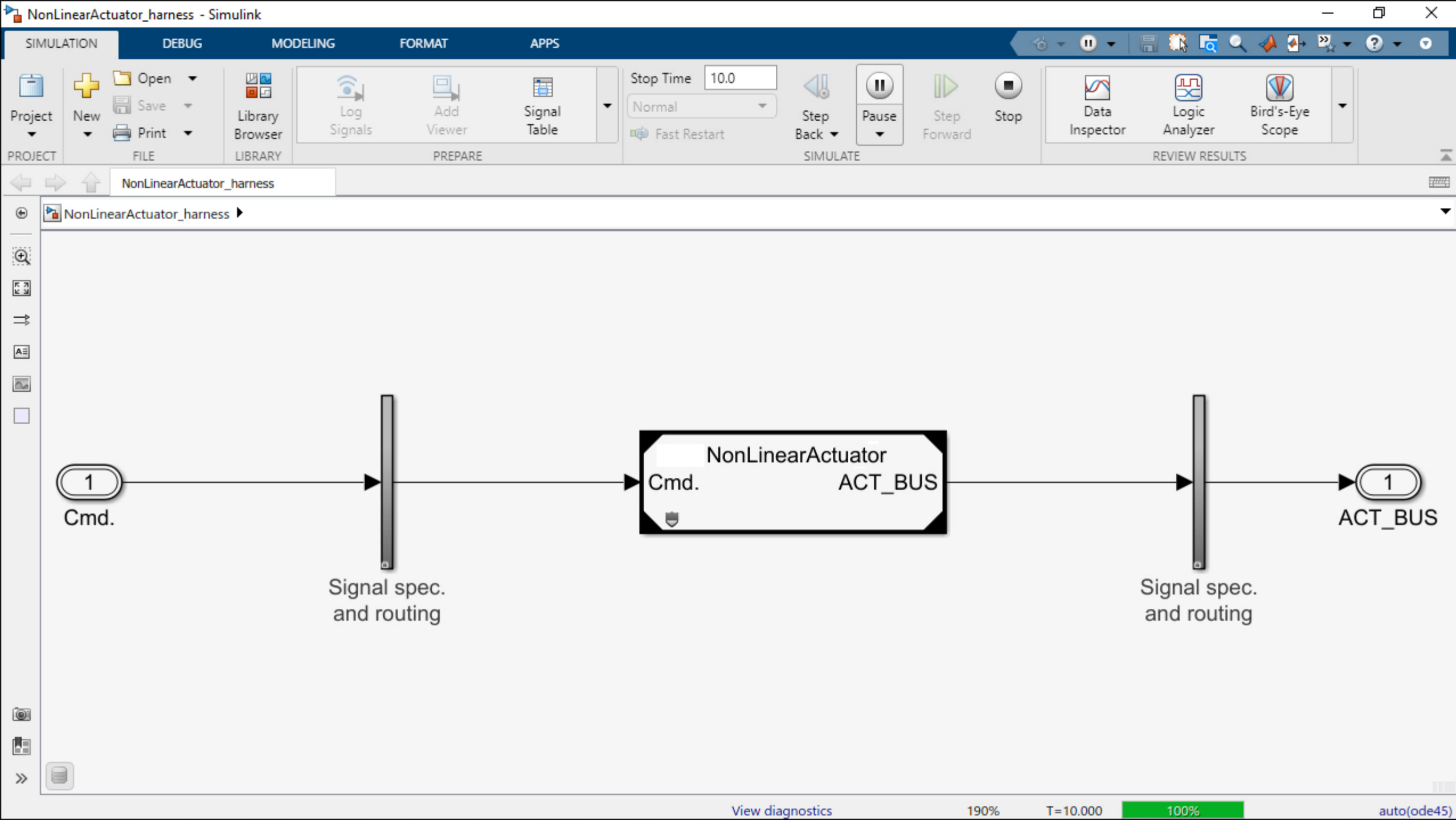
Verzia

Ochrana IP (intellectual property)




NonLinearActuator_harness/Model - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
New
Open
Save
Library
Log
Add
Signal
Stop Time
10.0
Normal
Fast Restart
Step Back
Run
Step Forward
Stop
SIMULATE
Data Inspector
Logic Analyzer
Bird's-Eye Scope
REVIEW RESULTS
Referenced Files
SAVE
Save
Ctrl+S
Save as...
Save Referenced Files
VIEWMARK
Save Viewmark
Capture model's current view for future access
Ctrl+Shift+D
EXPORT MODEL TO
Web View...
Export model to browser-enabled read-only view
Protected Model...
Create an IP-protected copy of this model
Template...
Create reusable template from this model
Architecture Model...
Export model to Architecture
Standalone FMU...
Export model to Co-Simulation Standalone Functional Mock-up Unit (FMU)
Previous Version...
Export model to previous version of Simulink
Rate Limits
1/Ta
1
s
Pos
actualposn_rad
1
ACT_BUS
100
s + 100
Actuator Position Sensor
measuredposn_rad
Ready
193%
auto(ode45)


NonLinearActuator_harness/Model - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
New
Open
Save
Print
FILE
Library Browser
LIBRARY
Log Signals
Stop Time
10.0
Normal
Logic Analyzer
Bird's-Eye Scope
REVIEW RESULTS
Referenced Files
Model
NonLinearActuator_harness
Model (NonLine
Create Protected Model: NonLinearActuator_harness
Description
Create a protected model (.slxp) that allows read-only view, simulation, and code generation of the model with optional password protection.
Allow user of protected model to
Open read-only view of model
Simulate
Use generated code
Content type:
Binaries
Use generated HDL code
Enter password (optional)
Re-enter password (option...
Options for saving protected model
Destination folder:
C:\Work\R2020b\protected\NonLinearActuator
Browse...
Contents:
Protected model (.slxp) and dependencies in a project
Create harness model for protected model
Name of project archive (.mlproj):
NonLinearActuator_harness_protected
Create
Cancel
Help
1
Cmd.
<actdemand_rad>
actualposn_rad
1
ACT_BUS
Actuator Position Sensor
Ready
193%
auto(ode45)


NonLinearActuator_harness - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
Project
New
Open
Save
Print
Library Browser
Log Signals
Add Viewer
Signal Table
Stop Time
10.0
Normal
Fast Restart
Step Back
Pause
Step Forward
Stop
Data Inspector
Logic Analyzer
Bird's-Eye Scope
PROJECT
FILE
LIBRARY
PREPARE
SIMULATE
REVIEW RESULTS
NonLinearActuator_harness
NonLinearActuator_harness
1
Cmd.
Signal spec. and routing
NonLinearActuator
Cmd.
ACT_BUS
Signal spec. and routing
1
ACT_BUS
View diagnostics
190%
T=10.000
100%
auto(ode45)

sl_sfcar_1.slx vs. sl_sfcar_2.slx

COMPARISON

Previous | Next | Swap | Refresh | Find | Linked Scrolling | Highlight Now | Always Highlight | FILTER | PUBLISH | MERGE

NAVIGATE | HIGHLIGHT

Left : sl_sfcar_1.slx

- Simulink
  - vehicle mph (yellow) & throttle %
  - Vehicle:2 -> transmission:3
    - SrcPort 2
    - SrcBlock Vehicle
    - DstBlock transmission
    - DstPort 3
    - Name transmission speed
  - shift_logic

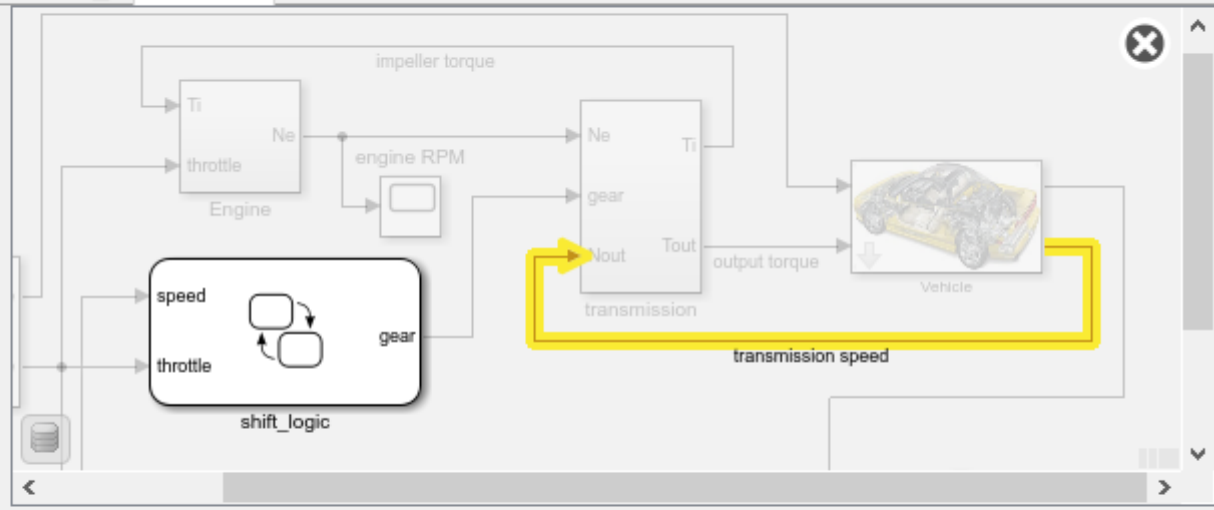
Right : sl_sfcar_2.slx

- Simulink
  - Out1
  - vehicle kph (yellow) & throttle %
  - Vehicle:2 -> Branch
  - shift_logic

Insertion | Deletion | Modification

sl_sfcar_1 - Simulink

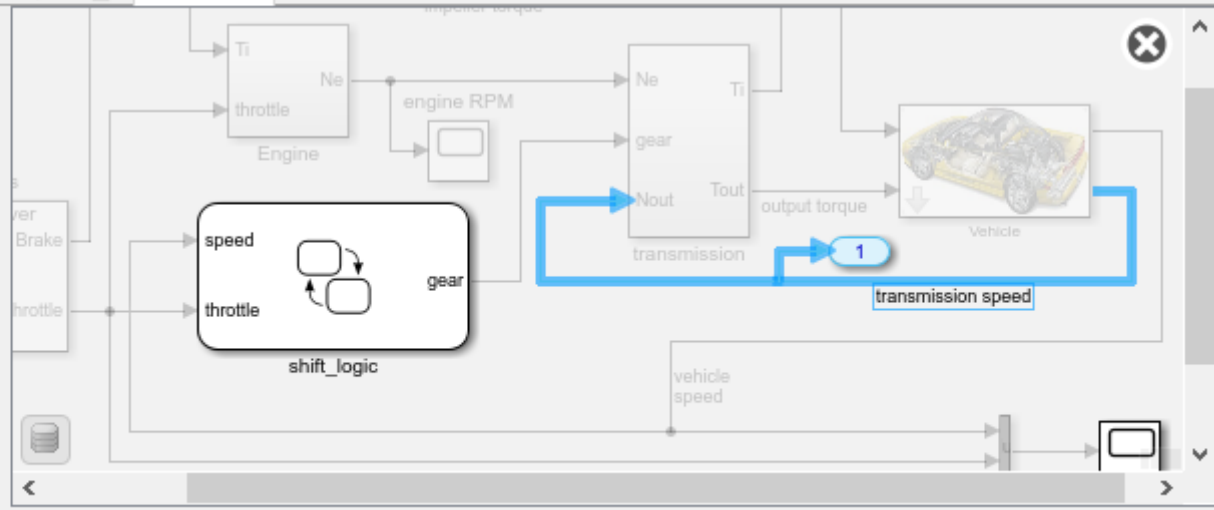
SIMULATION | DEBUG | MODELING | FORMAT | APPS



Ready | 100% | ode5

sl_sfcar_2 - Simulink

SIMULATION | DEBUG | MODELING | FORMAT | APPS | SIGNAL



Ready | 100% | ode5

sl_sfcar_1.slx vs. sl_sfcar_2.slx

COMPARISON

Previous | Next | Swap | Refresh | Find | Linked Scrolling | Highlight Now | Always Highlight | FILTER | PUBLISH | MERGE

NAVIGATE | HIGHLIGHT

Left : sl_sfcar_1.slx

- Simulink
  - vehicle mph (yellow) & throttle %
  - Vehicle:2 -> transmission:3
    - SrcPort 2
    - SrcBlock Vehicle
    - DstBlock transmission
    - DstPort 3
    - Name transmission speed
  - shift_logic

Right : sl_sfcar_2.slx

- Simulink
  - Out1
  - vehicle kph (
  - Vehicle:2 -> Branch
  - shift_logic

Publish

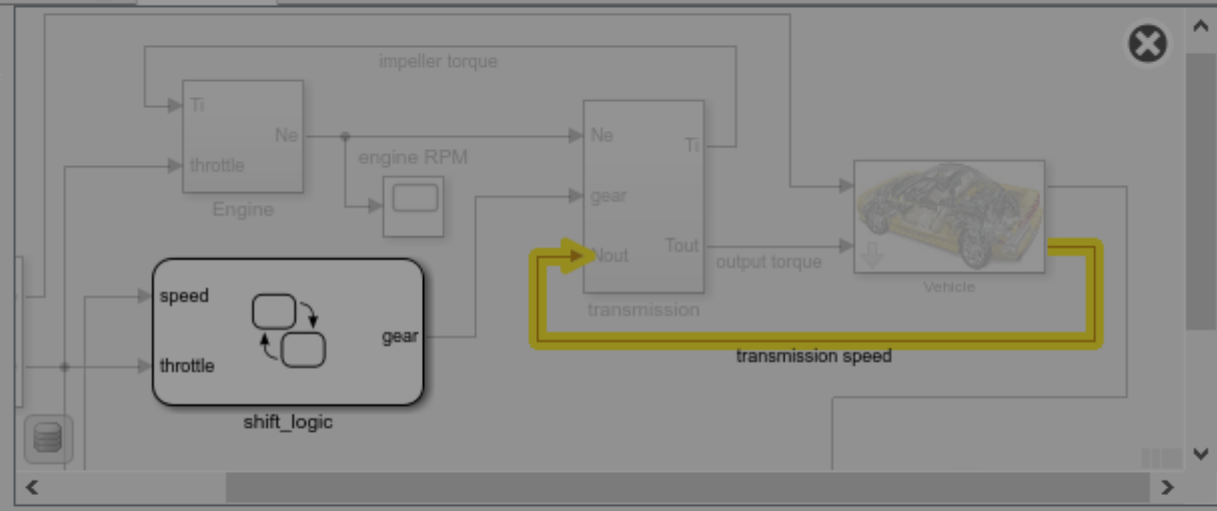
HTML
Word
PDF
Workspace Variable

Insertion | Deletion | Modification

sl_sfcar_1 - Simulink

SIMULATION | DEBUG | MODELING | FORMAT | APPS

sl_sfcar_1

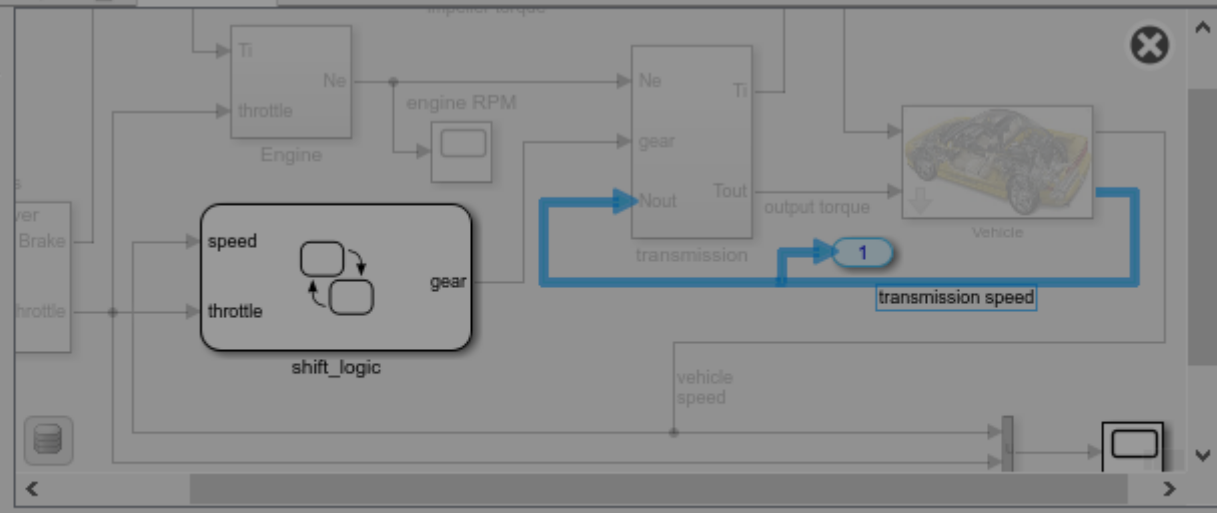


Ready 100% ode5

sl_sfcar_2 - Simulink

SIMULATION | DEBUG | MODELING | FORMAT | APPS | SIGNAL

sl_sfcar_2



Ready 100% ode5

Objektovo orientované programovanie

MATLAB

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Trial software | Contact sales

Use Object-Oriented Programming to Model Real-World Objects

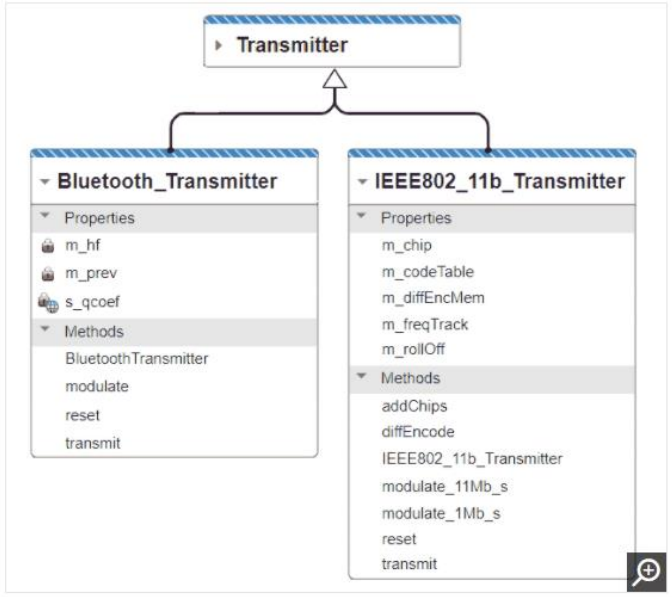
Object-oriented programming is a design approach that enables you to programmatically define structures called *objects* that combine data (properties) together with functions that operate on that data (methods). In MATLAB®, you can create objects that model the behavior of devices and systems in the real world. Those objects can then be used as building blocks in applications used to simulate and analyze complex systems.

Learn more

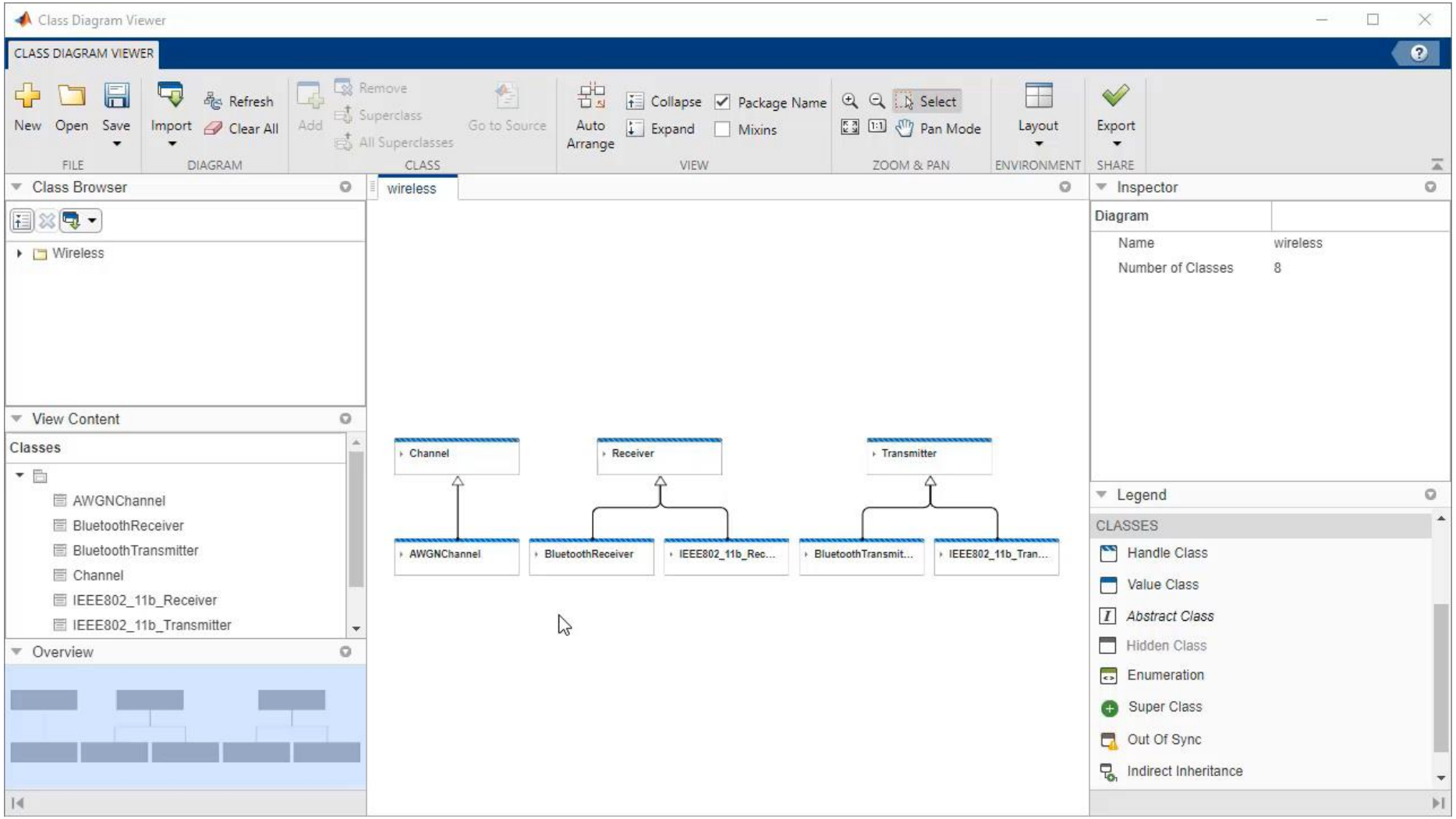
Developing and Deploying Sonar and Echosounder Data Analysis Software

Building and Extending Portfolio Optimization Models with MATLAB

Control System Modeling with Model Objects

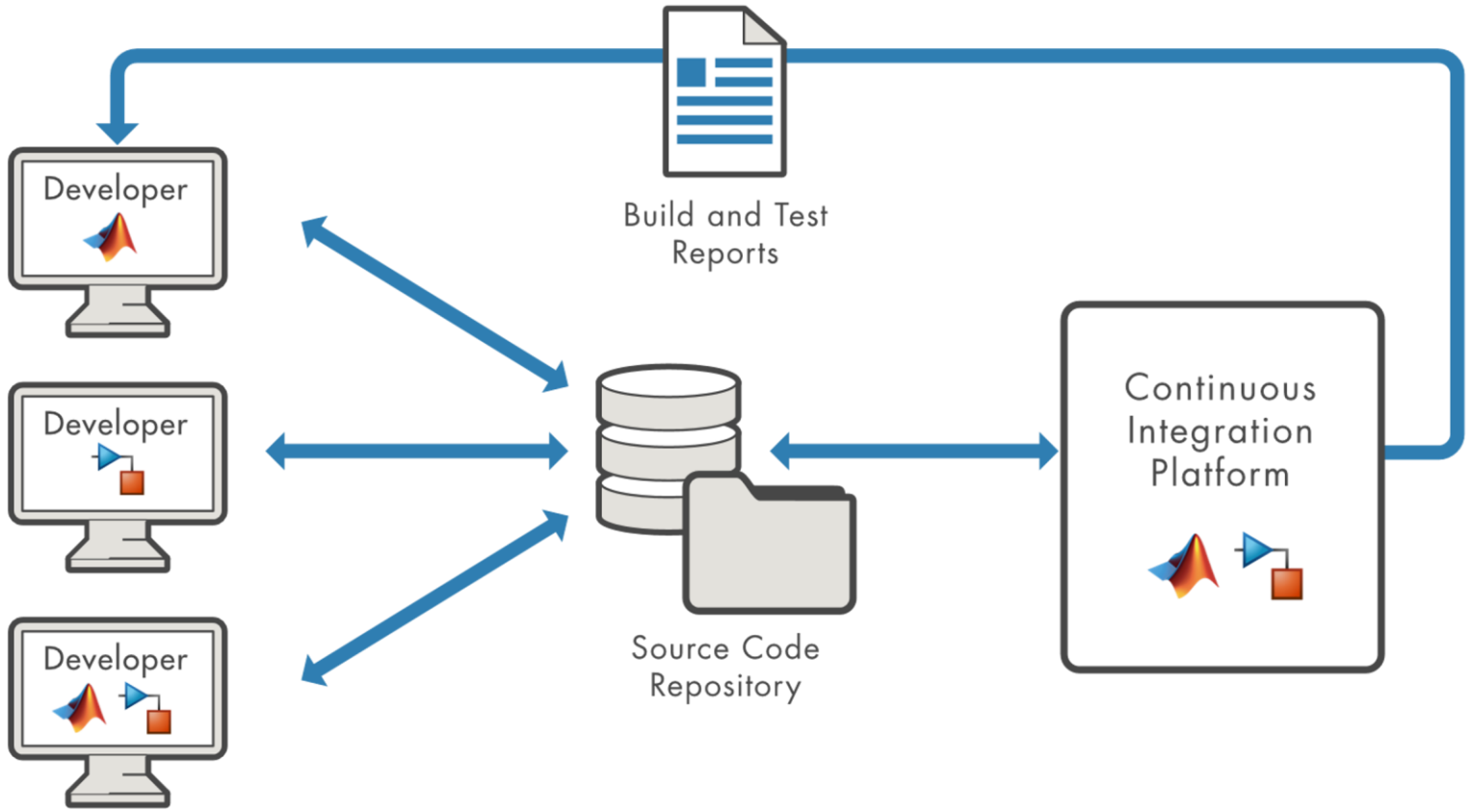


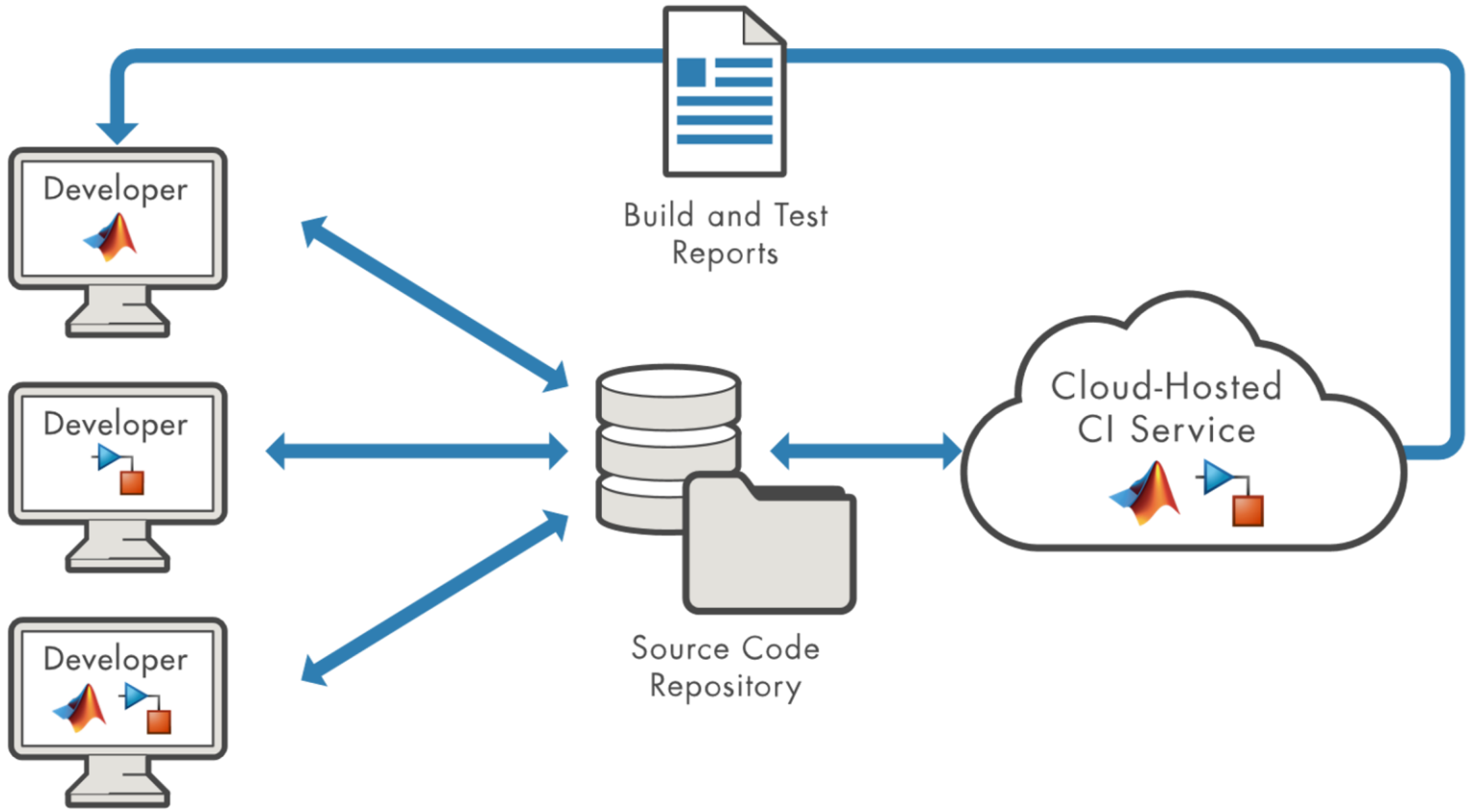
Example Transmitter classes in a wireless communications application.


Class Diagram Viewer
CLASS DIAGRAM VIEWER
New
Open
Save
FILE
Import
Refresh
Clear All
DIAGRAM
Add
Remove
Superclass
All Superclasses
Go to Source
CLASS
Auto Arrange
Collapse
Expand
Package Name
Mixins
VIEW
Select
Pan Mode
ZOOM & PAN
Layout
ENVIRONMENT
Export
SHARE
Class Browser
Wireless
View Content
Classes
AWGNChannel
BluetoothReceiver
BluetoothTransmitter
Channel
IEEE802_11b_Receiver
IEEE802_11b_Transmitter
Overview
wireless
Channel
Receiver
Transmitter
AWGNChannel
BluetoothReceiver
IEEE802_11b_Rec...
BluetoothTransmit...
IEEE802_11b_Tran...
Inspector
Diagram
Name
wireless
Number of Classes
8
Legend
CLASSES
Handle Class
Value Class
Abstract Class
Hidden Class
Enumeration
Super Class
Out Of Sync
Indirect Inheritance


Práca
Spolupráca
Produkcia


Práca
Spolupráca
Produkcia


Developer
Developer
Developer
Build and Test Reports
Source Code Repository
Continuous Integration Platform

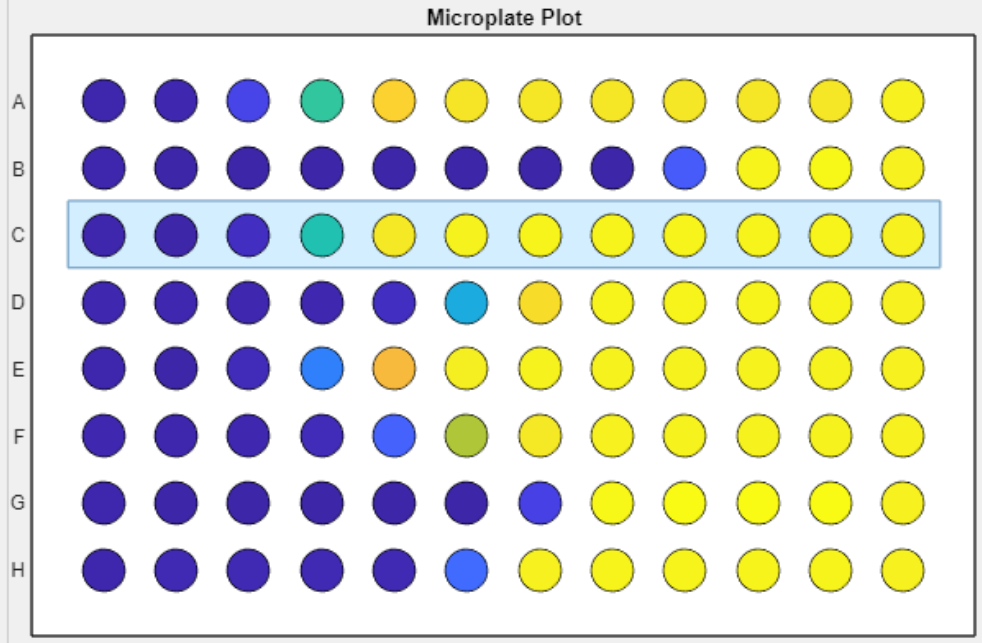

Developer
Developer
Developer
Build and Test
Reports
Source Code
Repository
Cloud-Hosted
CI Service

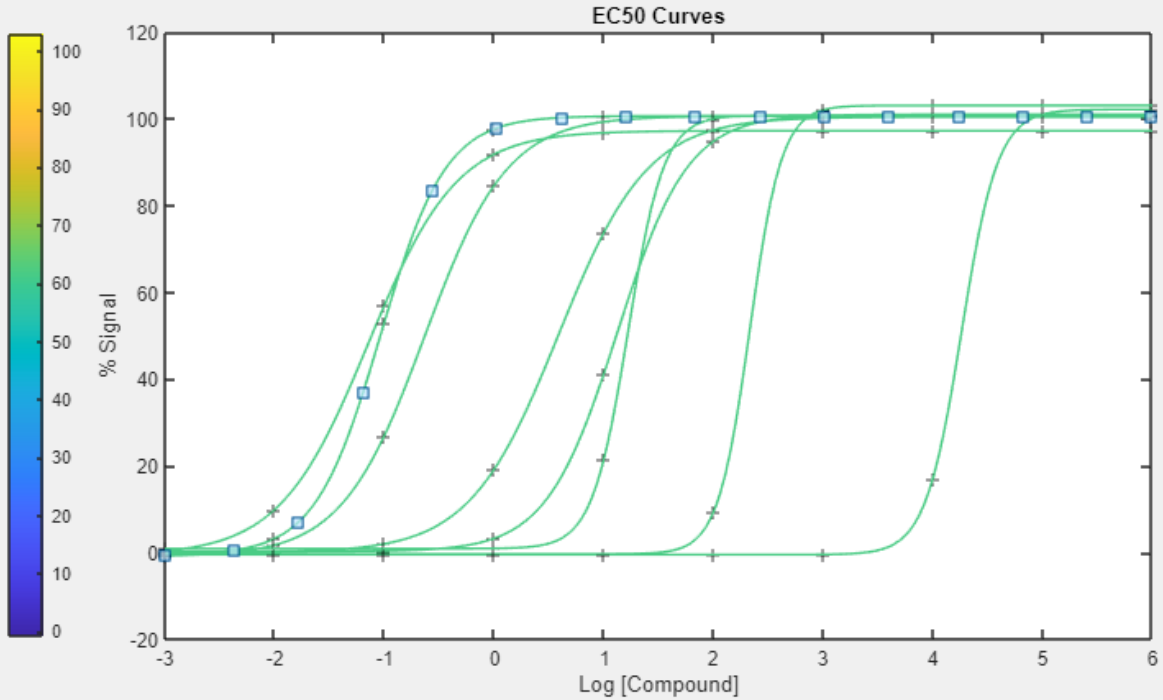
Tvorba aplikácií

Microplate analysis

Plate Browser | Summary Tables

Select Files | Current File: microtiter_data0001.csv





Previous File | Next File | Clear selection

File	Compound Nr	NegControl	Conc1	Conc2	Conc3	Conc4	Conc5	Conc6	Conc7	Conc8	Conc9	Conc10	PosControl	EC50	Hills slope
microtiter_data...	1	-0.0741	0.3564	9.8759	56.8743	91.7323	96.7084	97.1532	97.1910	97.1940	97.1940	97.1940	100	0.0719	1.074(
microtiter_data...	2	-0.0143	-0.5044	-0.5044	-0.5044	-0.5044	-0.5044	-0.5043	-0.4544	17.0436	100.9448	102.1084	100	1.8246e+04	2.624
microtiter_data...	3	0.0054	-0.4702	3.1998	52.9698	97.5746	100.5006	100.6086	100.6086	100.6086	100.6086	100.6086	100	0.0923	1.458
microtiter_data...	4	0.1096	0.2325	0.2385	0.3712	3.2339	41.1060	94.7343	100.6591	100.9487	100.9587	100.9587	100	13.2732	1.346
microtiter_data...	5	-0.0572	-0.7461	1.7104	26.8872	84.5134	99.2335	100.4717	100.5601	100.5700	100.5700	100.5700	100	0.2334	1.149(
microtiter_data...	6	0.0667	0.0146	0.1713	1.9726	19.0989	73.6380	97.3556	100.1063	100.3510	100.3710	100.3710	100	3.8757	1.069(
microtiter_data...	7	0.0044	-0.3527	-0.3527	-0.3527	-0.3527	-0.3417	9.2696	101.9774	103.0170	103.0170	103.0170	100	214.5800	2.981(

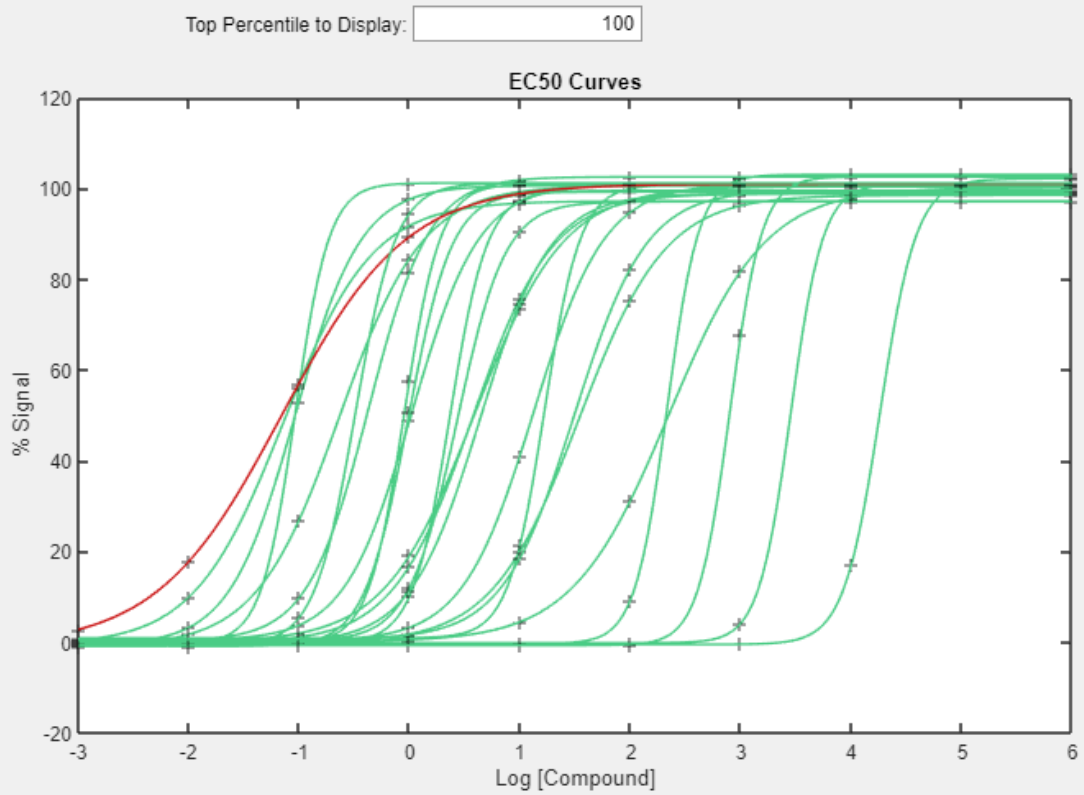
Microplate analysis

Plate Browser | Summary Tables

Analyze Selected Files | Save Results

Top Results | All Results

FileName	CompoundNumber	EC50	Reliable
microtiter_data0001.csv	1	0.0719	☑
microtiter_data0001.csv	3	0.0923	☑
microtiter_data0003.csv	17	0.0925	☑
microtiter_data0001.csv	5	0.2334	☑
microtiter_data0003.csv	23	0.3225	☑
microtiter_data0002.csv	16	0.4257	☑
microtiter_data0002.csv	13	0.8963	☑
microtiter_data0002.csv	14	0.9717	☑
microtiter_data0002.csv	10	1.0515	☑
microtiter_data0002.csv	15	2.3188	☑
microtiter_data0002.csv	11	2.6921	☑
microtiter_data0002.csv	9	3.7073	☑
microtiter_data0001.csv	6	3.8757	☑
microtiter_data0003.csv	21	4.3720	☑
microtiter_data0001.csv	4	13.2732	☑
microtiter_data0001.csv	8	16.6548	☑
microtiter_data0003.csv	24	31.1400	☑
microtiter_data0003.csv	22	34.1977	☑
microtiter_data0001.csv	7	214.5800	☑
microtiter_data0003.csv	18	222.6496	☑
microtiter_data0003.csv	20	797.6649	☑
microtiter_data0002.csv	12	2.8290e+03	☑
microtiter_data0001.csv	2	1.8246e+04	☑
microtiter_data0003.csv	19	0.0698	☐

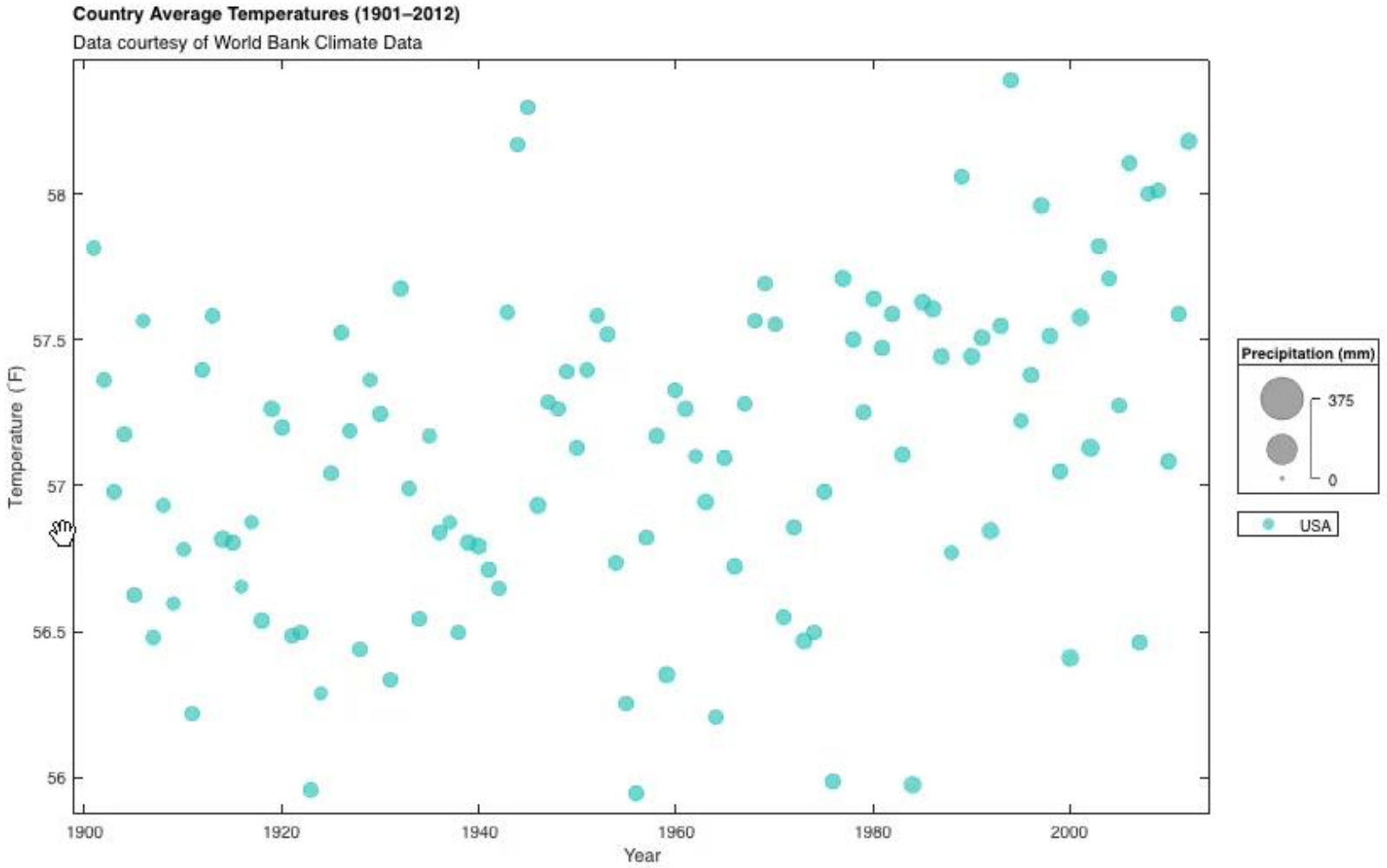


World Climate

Select a Country +

Select a Visualization +

Configure Settings +



About This App

This app was built in MATLAB® using features from R2019a through R2021a. The app's layout is managed using **UIGRIDLAYOUT**. The side panel is a combination of HTML, JavaScript, and CSS integrated via the **UIHTML** function, plus **UIIMAGE** for the MathWorks logo. The layout for the legends and the **BUBBLECHART** and **SWARMCHART** visualizations are managed using a flow **TILEDLAYOUT**. Interactivity makes use of default interactions and custom **DataTipTemplate** properties. Lastly, this info panel uses an HTML interpreter for the label's text, and a **UIHYPERLINK** for the link.

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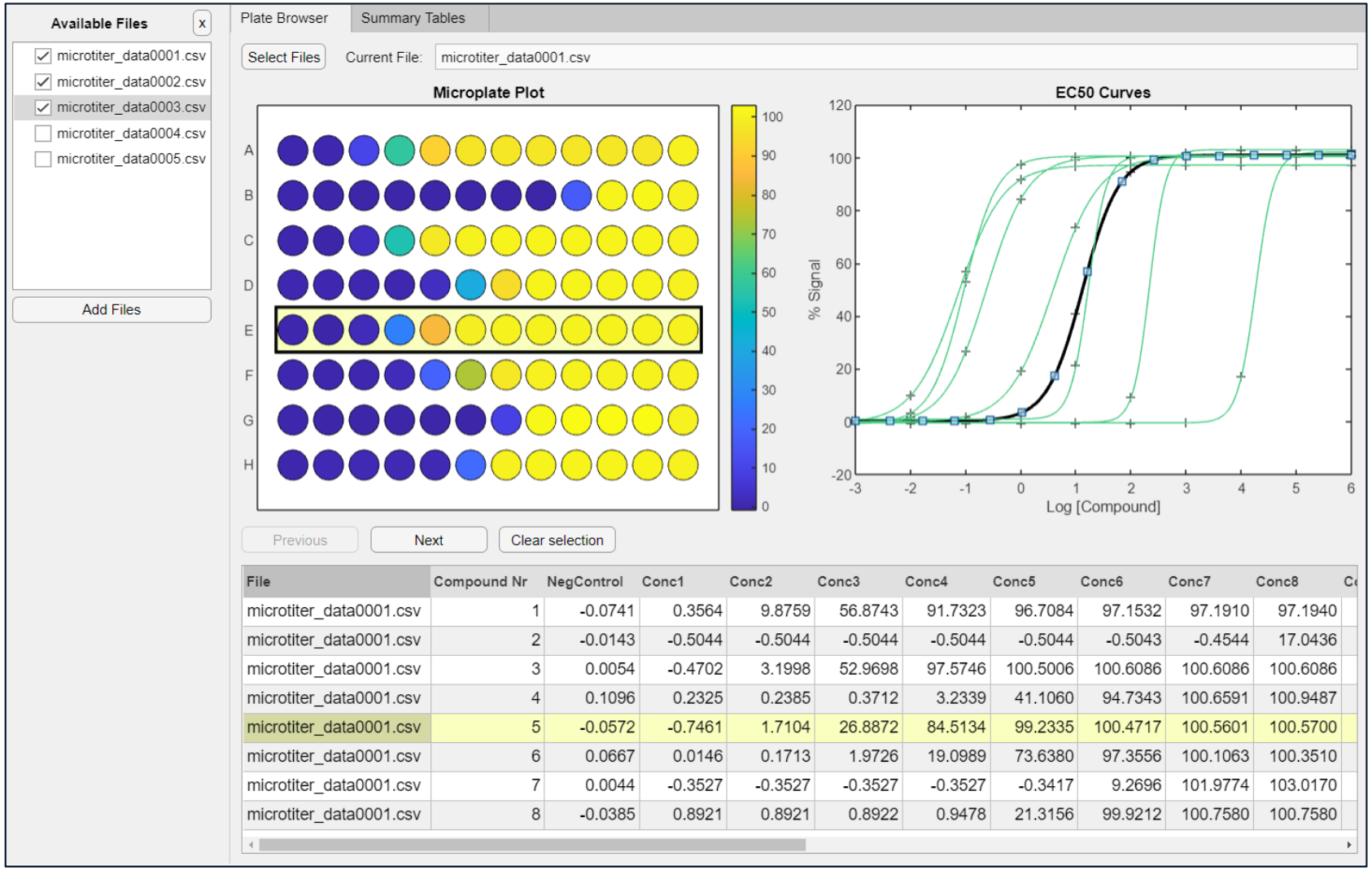


File	Compound Nr	NegControl	Conc1	Conc2	Conc3	Conc4	Conc5	Conc6	Conc7	Conc8	C
microtiter_data0001.csv	1	-0.0741	0.3564	9.8759	56.8743	91.7323	96.7084	97.1532	97.1910	97.1940	
microtiter_data0001.csv	2	-0.0143	-0.5044	-0.5044	-0.5044	-0.5044	-0.5044	-0.5043	-0.4544	17.0436	
microtiter_data0001.csv	3	0.0054	-0.4702	3.1998	52.9698	97.5746	100.5006	100.6086	100.6086	100.6086	
microtiter_data0001.csv	4	0.1096	0.2325	0.2385	0.3712	3.2339	41.1060	94.7343	100.6591	100.9487	
microtiter_data0001.csv	5	-0.0572	-0.7461	1.7104	26.8872	84.5134	99.2335	100.4717	100.5601	100.5700	
microtiter_data0001.csv	6	0.0667	0.0146	0.1713	1.9726	19.0989	73.6380	97.3556	100.1063	100.3510	
microtiter_data0001.csv	7	0.0044	-0.3527	-0.3527	-0.3527	-0.3527	-0.3417	9.2696	101.9774	103.0170	
microtiter_data0001.csv	8	-0.0385	0.8921	0.8921	0.8922	0.9478	21.3156	99.9212	100.7580	100.7580	

MicroPlate

webapp/webapps/home/session.html?app=MicroPlate

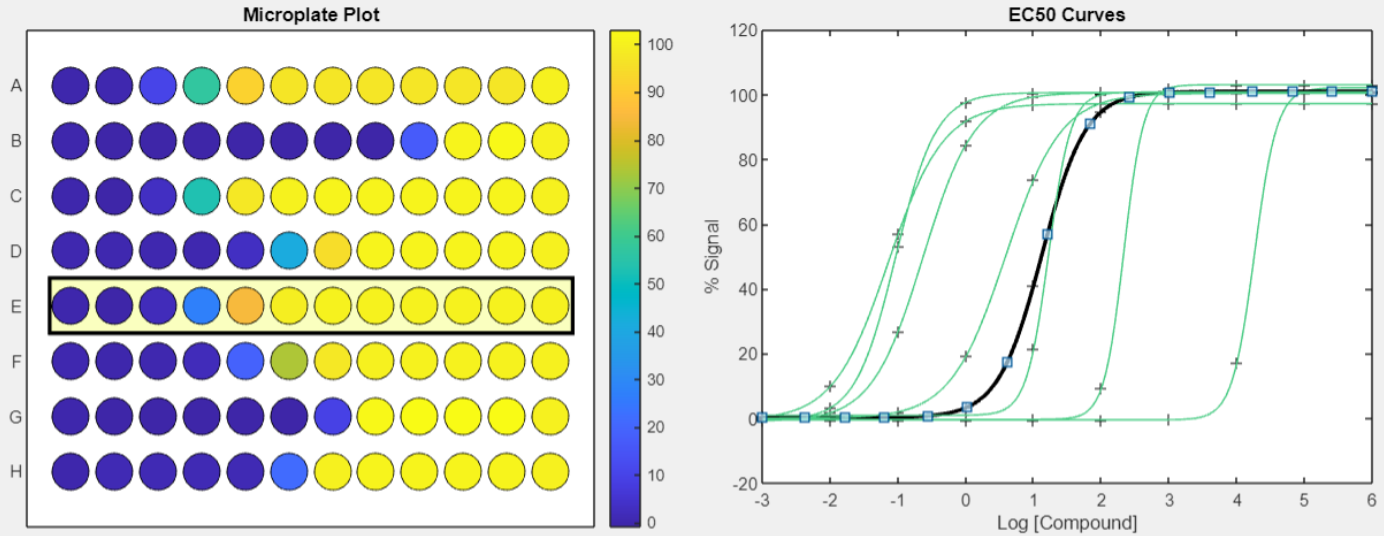
Available Files

- [x] microtiter_data0001.csv
- [x] microtiter_data0002.csv
- [x] microtiter_data0003.csv
- [ ] microtiter_data0004.csv
- [ ] microtiter_data0005.csv

Add Files

Plate Browser | Summary Tables

Select Files | Current File: microtiter_data0001.csv



Previous | Next | Clear selection

File	Compound Nr	NegControl	Conc1	Conc2	Conc3	Conc4	Conc5	Conc6	Conc7	Conc8	Co
microtiter_data0001.csv	1	-0.0741	0.3564	9.8759	56.8743	91.7323	96.7084	97.1532	97.1910	97.1940	
microtiter_data0001.csv	2	-0.0143	-0.5044	-0.5044	-0.5044	-0.5044	-0.5044	-0.5043	-0.4544	17.0436	
microtiter_data0001.csv	3	0.0054	-0.4702	3.1998	52.9698	97.5746	100.5006	100.6086	100.6086	100.6086	
microtiter_data0001.csv	4	0.1096	0.2325	0.2385	0.3712	3.2339	41.1060	94.7343	100.6591	100.9487	
microtiter_data0001.csv	5	-0.0572	-0.7461	1.7104	26.8872	84.5134	99.2335	100.4717	100.5601	100.5700	
microtiter_data0001.csv	6	0.0667	0.0146	0.1713	1.9726	19.0989	73.6380	97.3556	100.1063	100.3510	
microtiter_data0001.csv	7	0.0044	-0.3527	-0.3527	-0.3527	-0.3527	-0.3417	9.2696	101.9774	103.0170	
microtiter_data0001.csv	8	-0.0385	0.8921	0.8921	0.8922	0.9478	21.3156	99.9212	100.7580	100.7580	

Show Log

Simulinkový model v aplikácií

HEV P4 Reference Application

https://webapp.mathworks.com/session.html?app=HEVP4ReferenceApplication

Login | Drive Cycle Setup | Model Parameters Setup | Simulation and Visualization | Session Notes | Session Log

Control

Ready to simulate

Start Simulation

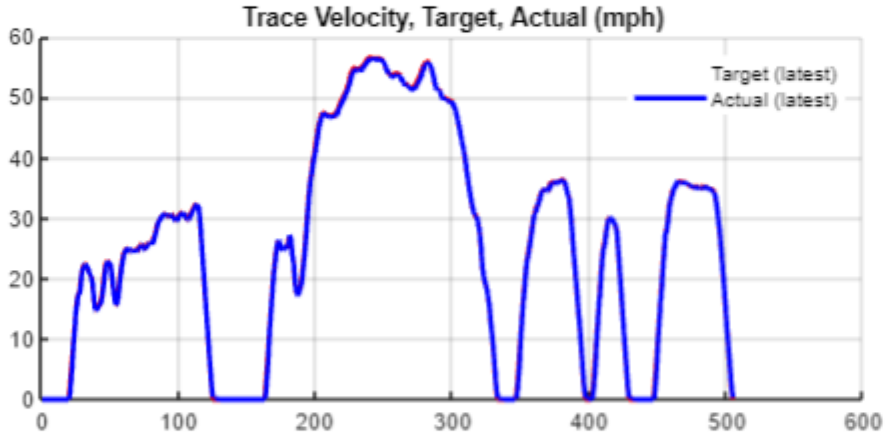
Generate Report

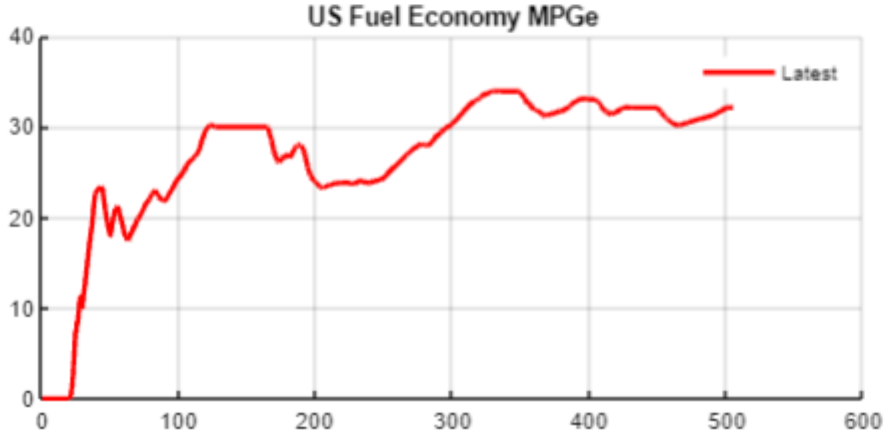
Output plots:

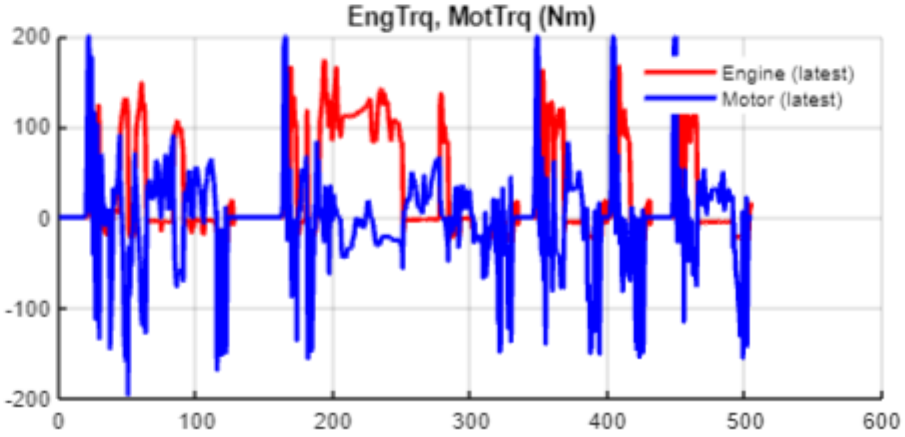
- [x] Velocity
- [x] Engine / Motor Torque (Nm)
- [x] Battery SOC
- [ ] TP HC Mass
- [ ] TP NOx Mass
- [ ] Engine / Motor Speed (RPM)
- [ ] Battery Current (A)
- [x] US Fuel Economy (MPGe)
- [ ] TP CO Mass
- [ ] TP CO2 Mass

Clear all

Visualization

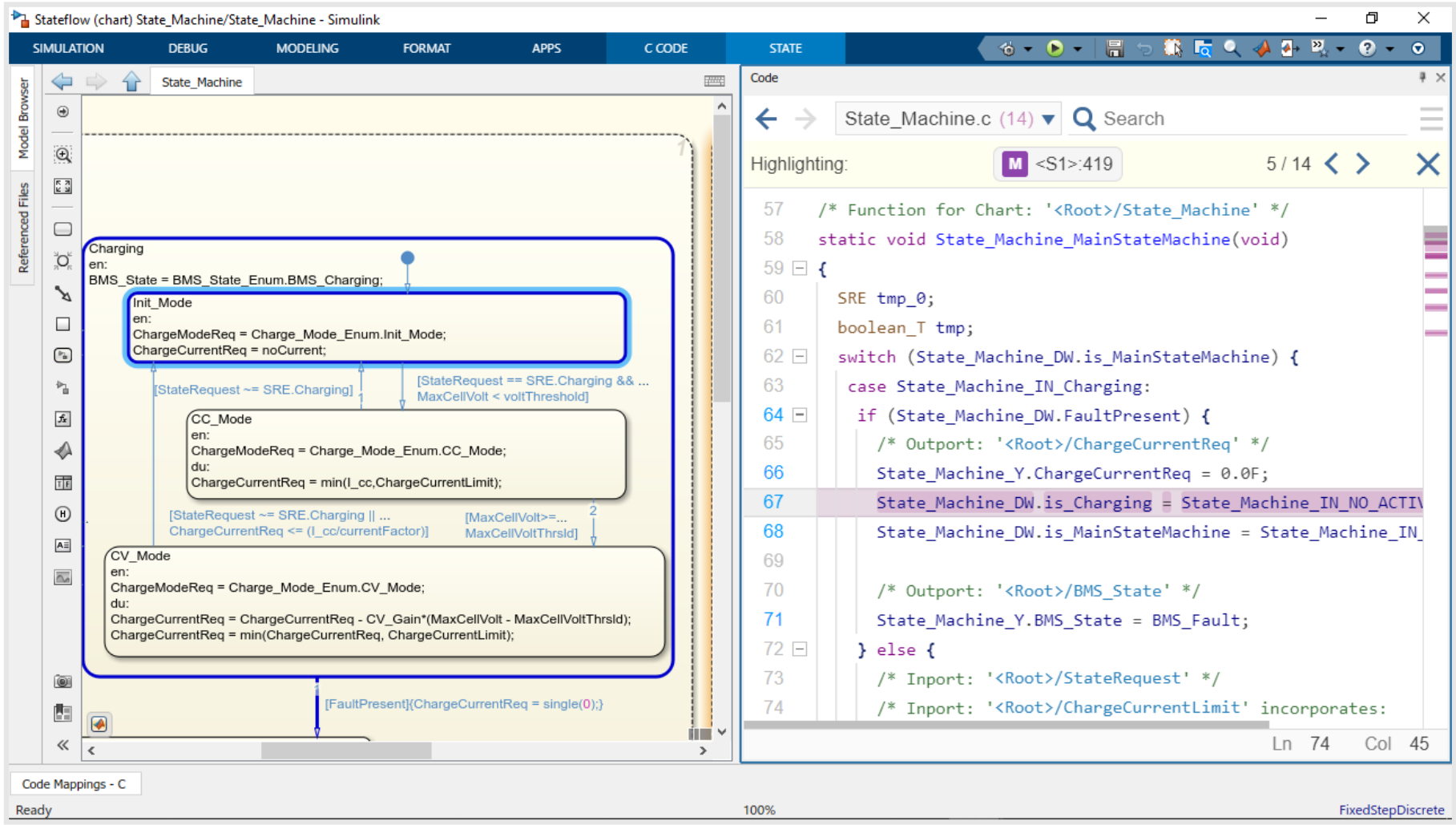






Show Log

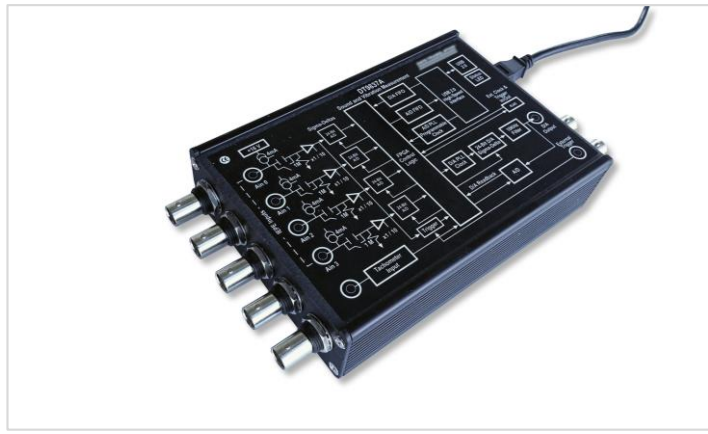
Generovanie kódu

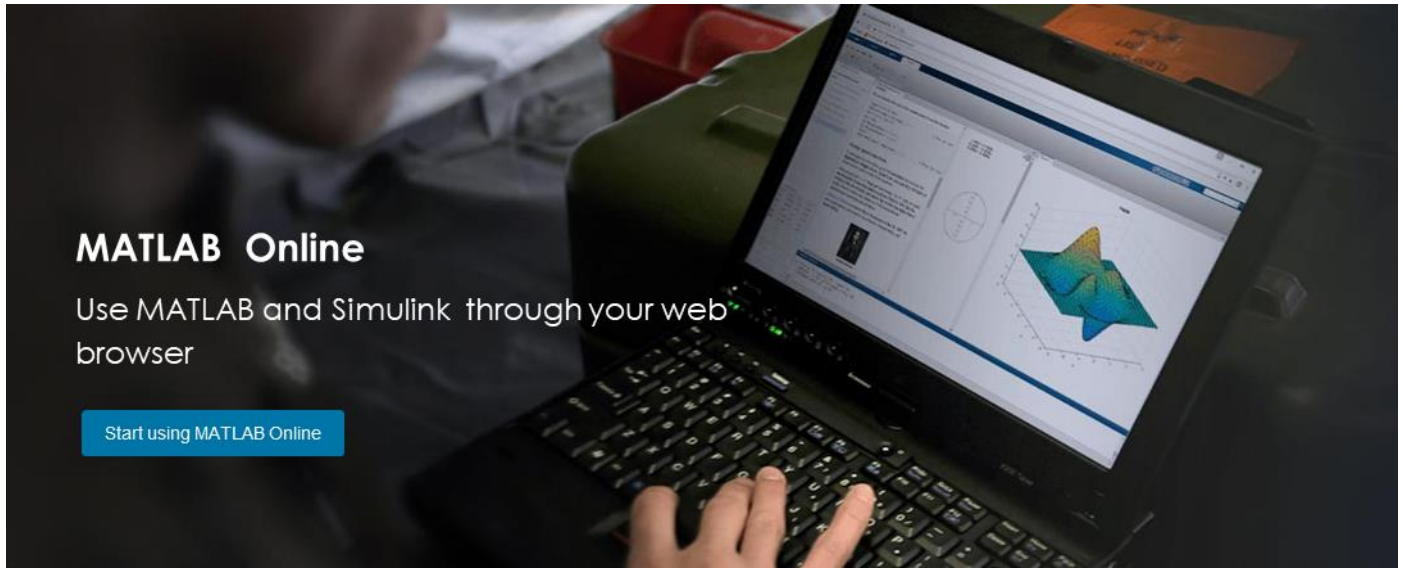

Stateflow (chart) State_Machine/State_Machine - Simulink
SIMULATION
DEBUG
MODELING
FORMAT
APPS
C CODE
STATE
Model Browser
Referenced Files
State_Machine
Charging
en:
BMS_State = BMS_State_Enum.BMS_Charging;
Init_Mode
en:
ChargeModeReq = Charge_Mode_Enum.Init_Mode;
ChargeCurrentReq = noCurrent;
[StateRequest ~= SRE.Charging]
[StateRequest == SRE.Charging && ...
MaxCellVolt < voltThreshold]
CC_Mode
en:
ChargeModeReq = Charge_Mode_Enum.CC_Mode;
du:
ChargeCurrentReq = min(I_cc,ChargeCurrentLimit);
[StateRequest ~= SRE.Charging || ...
ChargeCurrentReq <= (I_cc/currentFactor)]
[MaxCellVolt>=...
MaxCellVoltThrsld]
CV_Mode
en:
ChargeModeReq = Charge_Mode_Enum.CV_Mode;
du:
ChargeCurrentReq = ChargeCurrentReq - CV_Gain*(MaxCellVolt - MaxCellVoltThrsld);
ChargeCurrentReq = min(ChargeCurrentReq, ChargeCurrentLimit);
[FaultPresent]{ChargeCurrentReq = single(0);}
Code
State_Machine.c (14)
Search
Highlighting:
<S1>:419
5 / 14
57 /* Function for Chart: '<Root>/State_Machine' */
58 static void State_Machine_MainStateMachine(void)
59 {
60 SRE tmp_0;
61 boolean_T tmp;
62 switch (State_Machine_DW.is_MainStateMachine) {
63 case State_Machine_IN_Charging:
64 if (State_Machine_DW.FaultPresent) {
65 /* Outport: '<Root>/ChargeCurrentReq' */
66 State_Machine_Y.ChargeCurrentReq = 0.0F;
67 State_Machine_DW.is_Charging = State_Machine_IN_NO_ACTI
68 State_Machine_DW.is_MainStateMachine = State_Machine_IN_
69
70 /* Outport: '<Root>/BMS_State' */
71 State_Machine_Y.BMS_State = BMS_Fault;
72 } else {
73 /* Inport: '<Root>/StateRequest' */
74 /* Inport: '<Root>/ChargeCurrentLimit' incorporates:
Ln 74 Col 45
Code Mappings - C
Ready
100%
FixedStepDiscrete

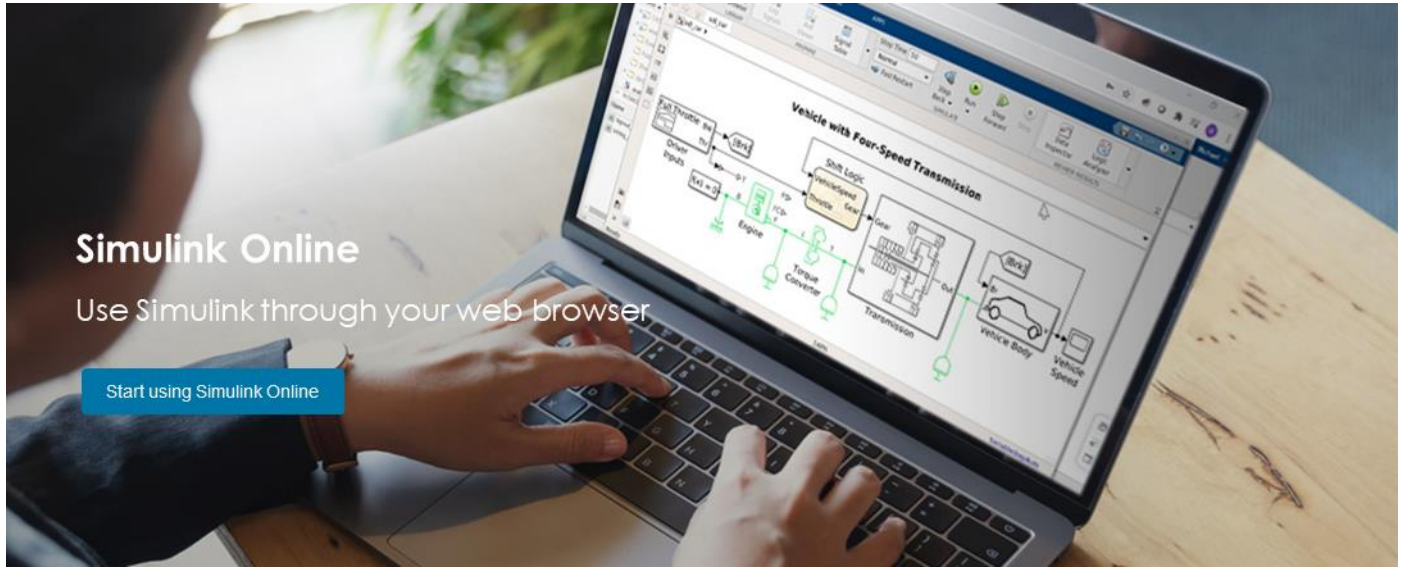
Integrácia a nasadenie na hardvér


open ecu


performance
real-time
target
machine







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Release Highlights

New Products

- **DDS Blockset** - Design and simulate DDS applications
- **Radar Toolbox** - Design, simulate, and test multifunction radar systems
- **Satellite Communication Toolbox** - Simulate, analyze, and test satellite communications systems and links

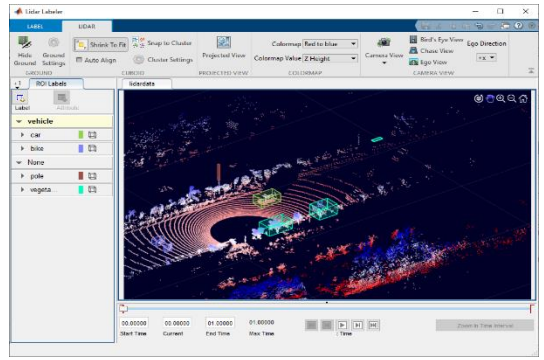
Major Updates

Resources

- Release Notes
- Why Upgrade?
- License-Related Changes
- Software Maintenance Service
- System Requirements
- Previous Releases

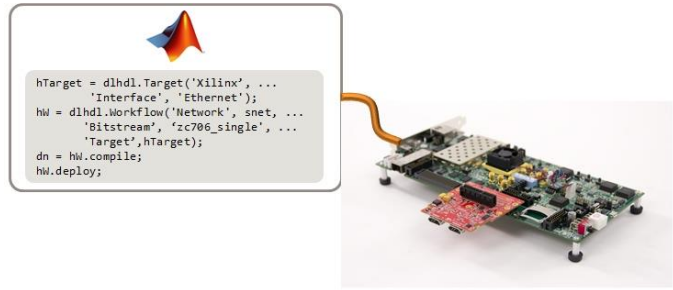
Nové produkty R2020b

RoadRunner, RoadRunner Asset Library
RoadRunner Scene Builder



Lidar Toolbox

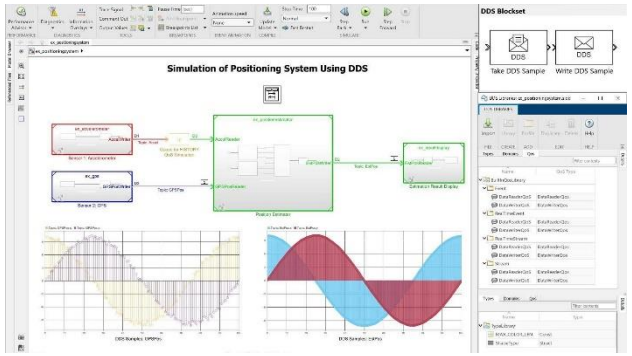
UAV Toolbox



Deep Learning HDL Toolbox

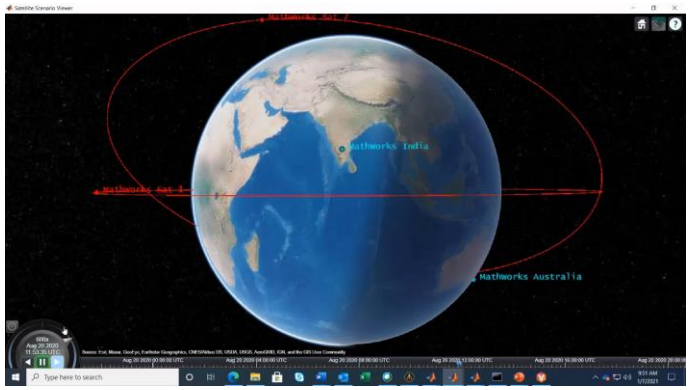
https://www.mathworks.com/products/new_products/release2020b.html

Nové produkty R2021a



DDS Blockset

Radar Toolbox



Satellite Communication Toolbox

https://www.mathworks.com/products/new_products/latest_features.html

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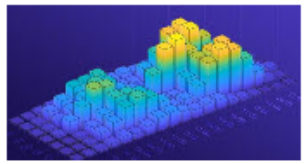

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Ďakujem za pozornosť