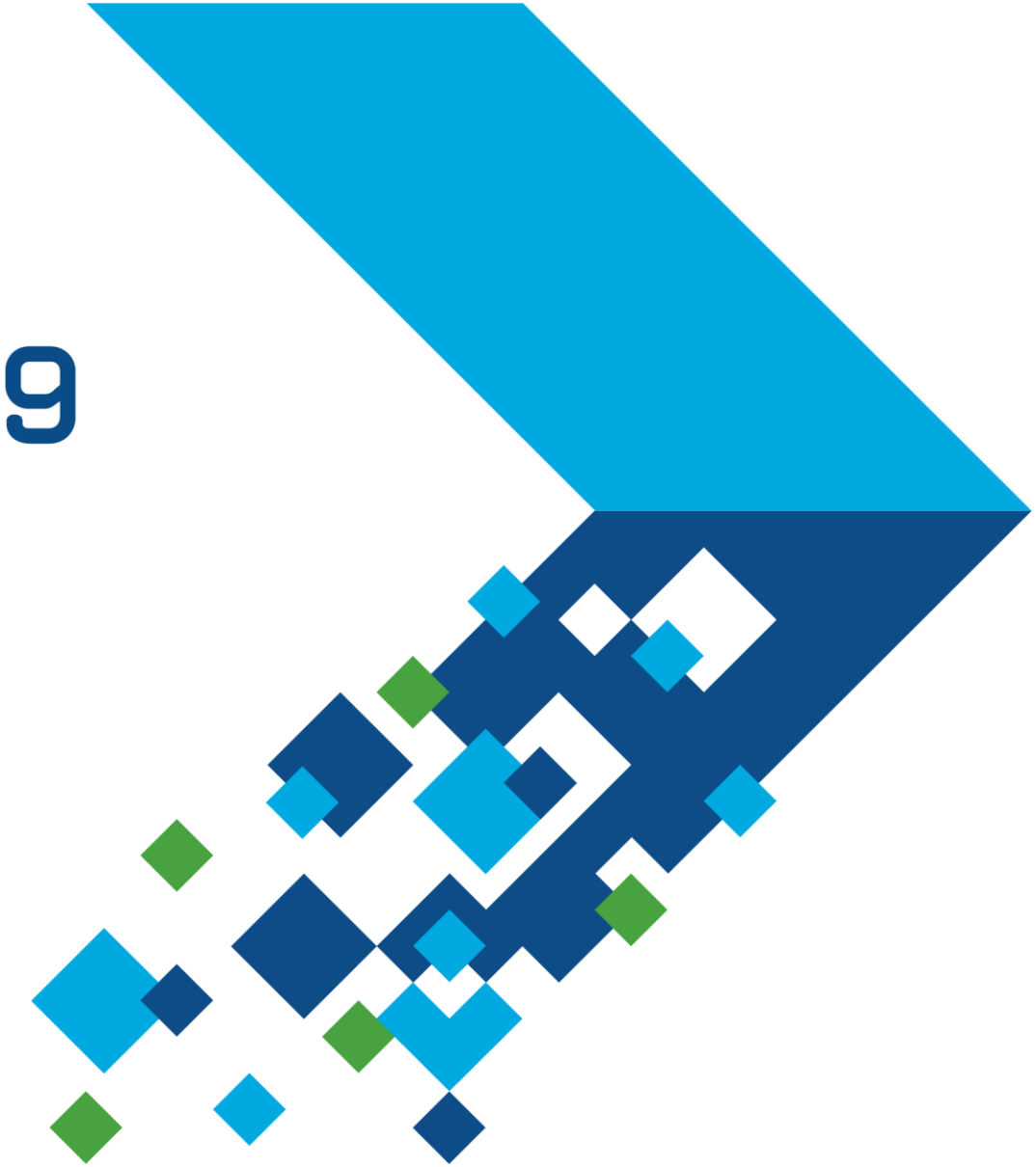
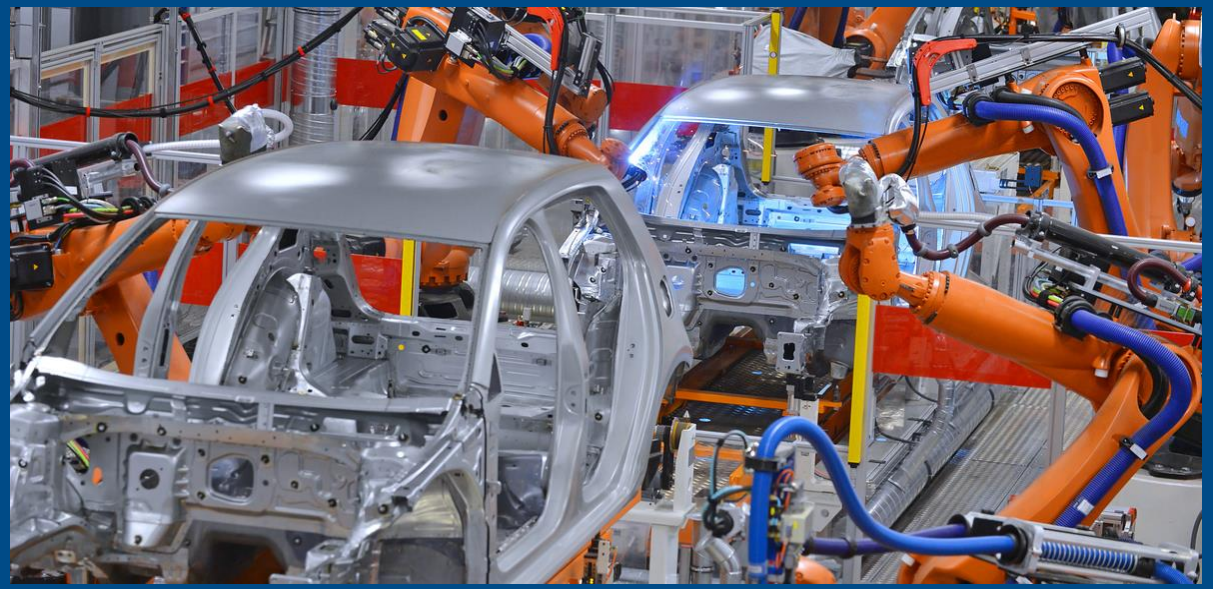
MATLAB EXPO 2019

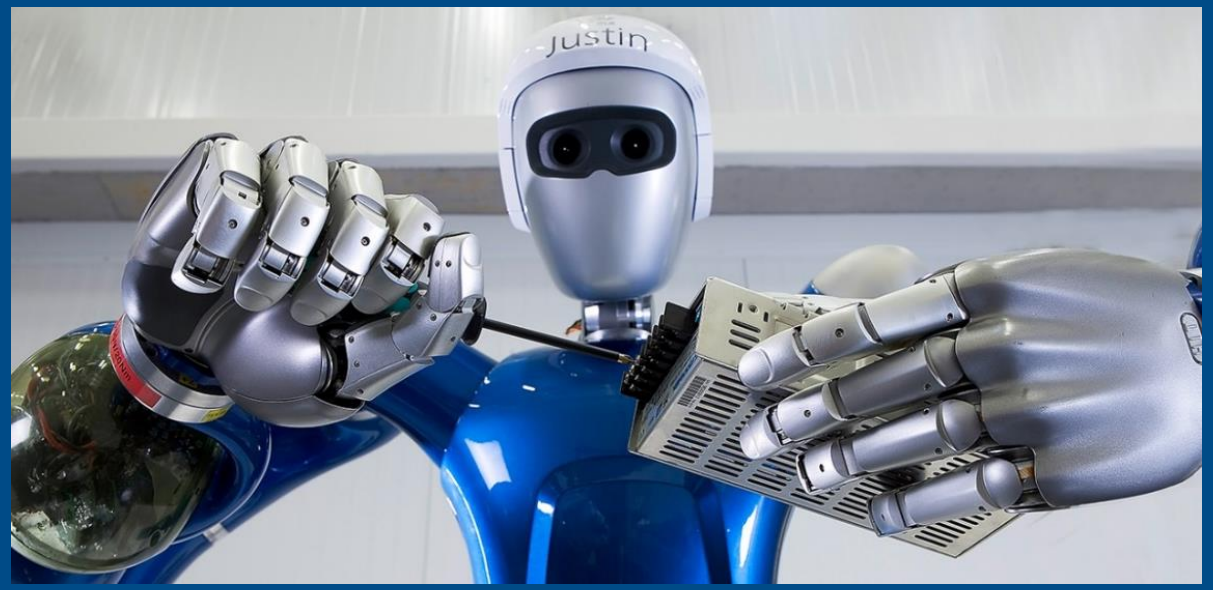
What's New in Simulink

Jonathan Agg



Algorithms in Everything





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Using MATLAB & Simulink to Build Algorithms in Everything

Simplifying your work…

…by working at good levels of abstraction.

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Using MATLAB & Simulink to Build Algorithms in Everything

Inputs

Design

Outputs

MATLAB&SIMULINK®

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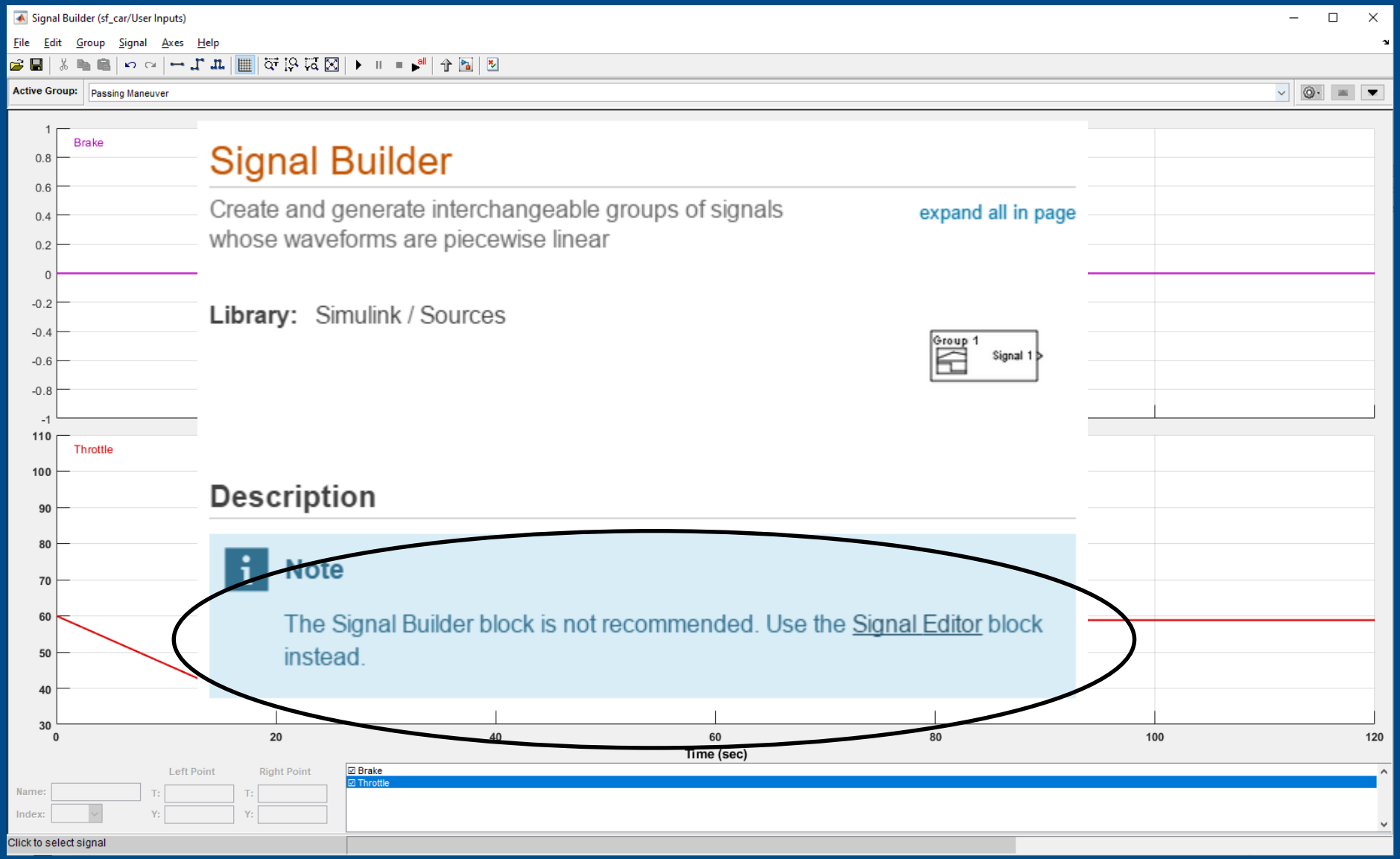
Creating Your Own Data



Simulink

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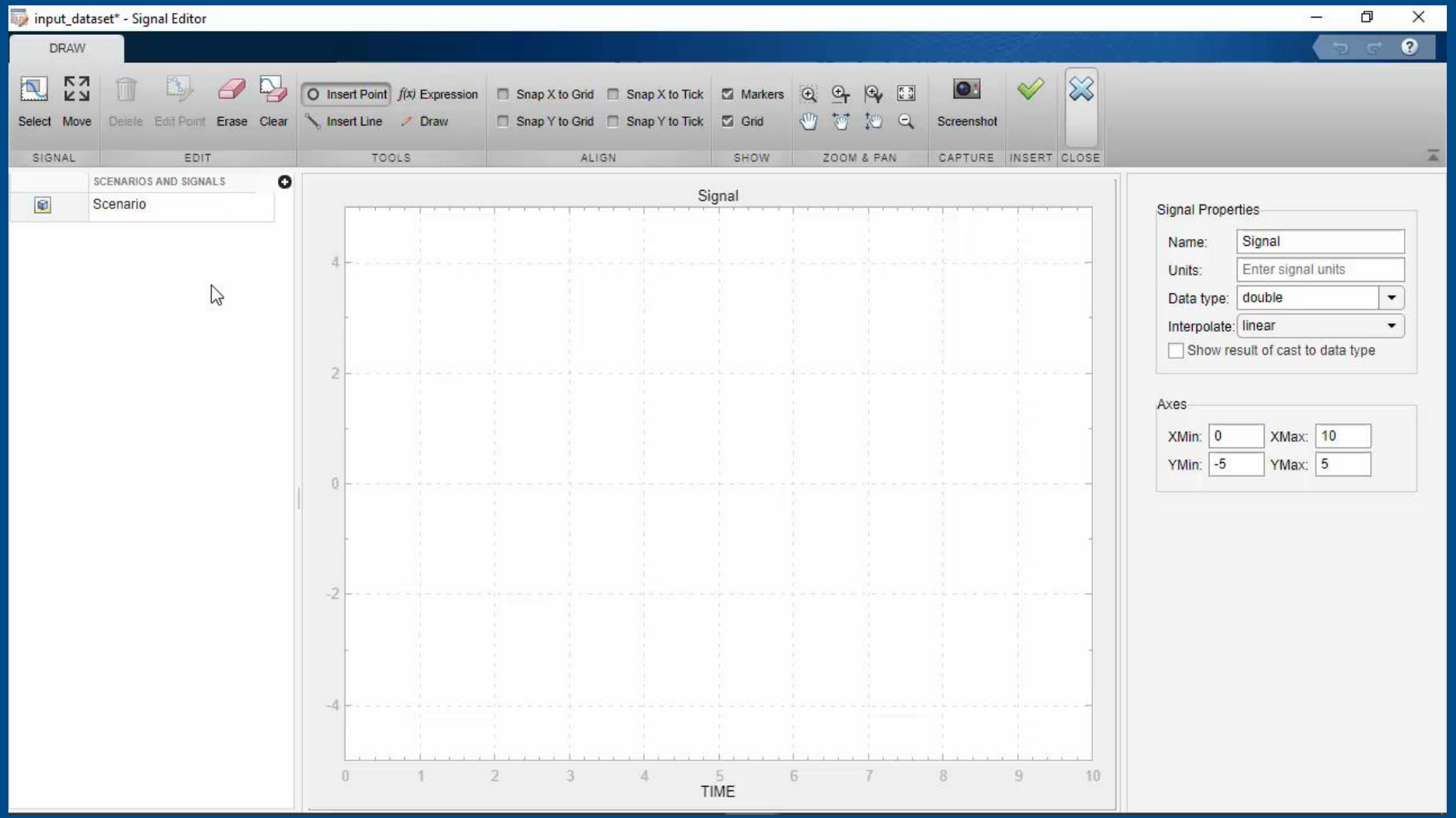
Creating Your Own Data



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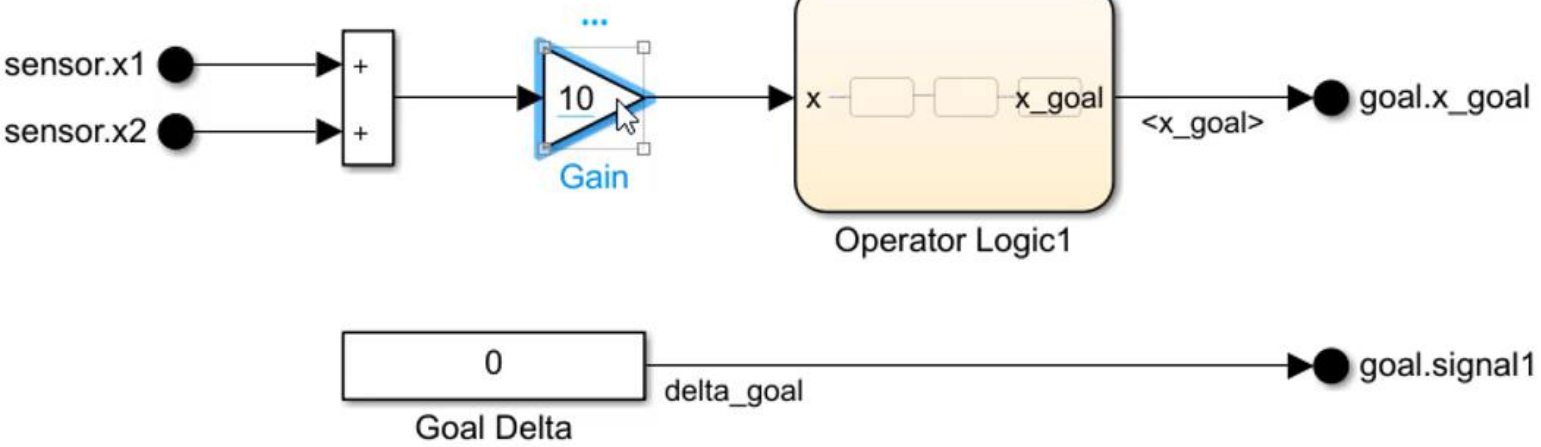
Changing Block Parameters



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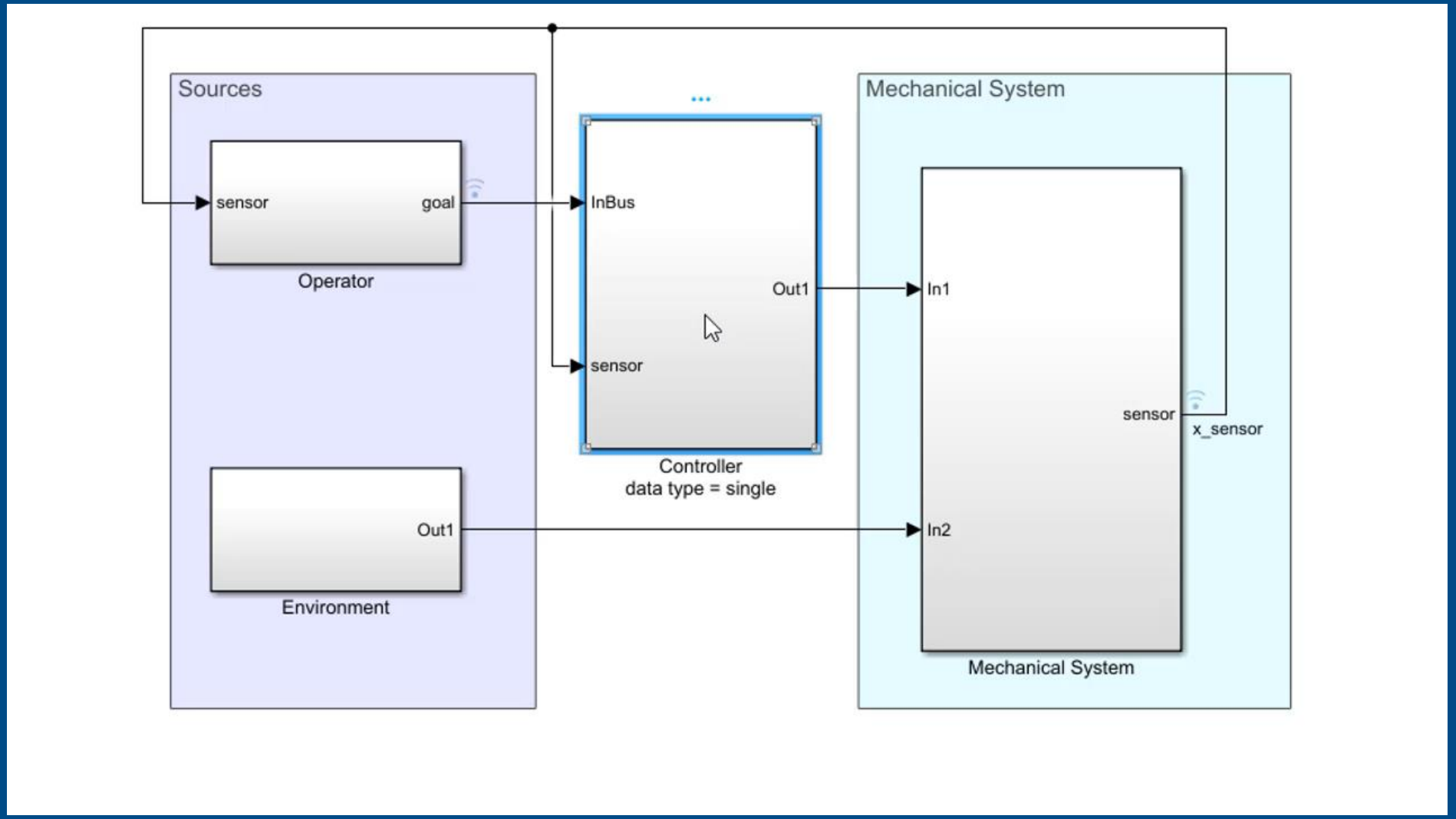
Model Navigation



Simulink

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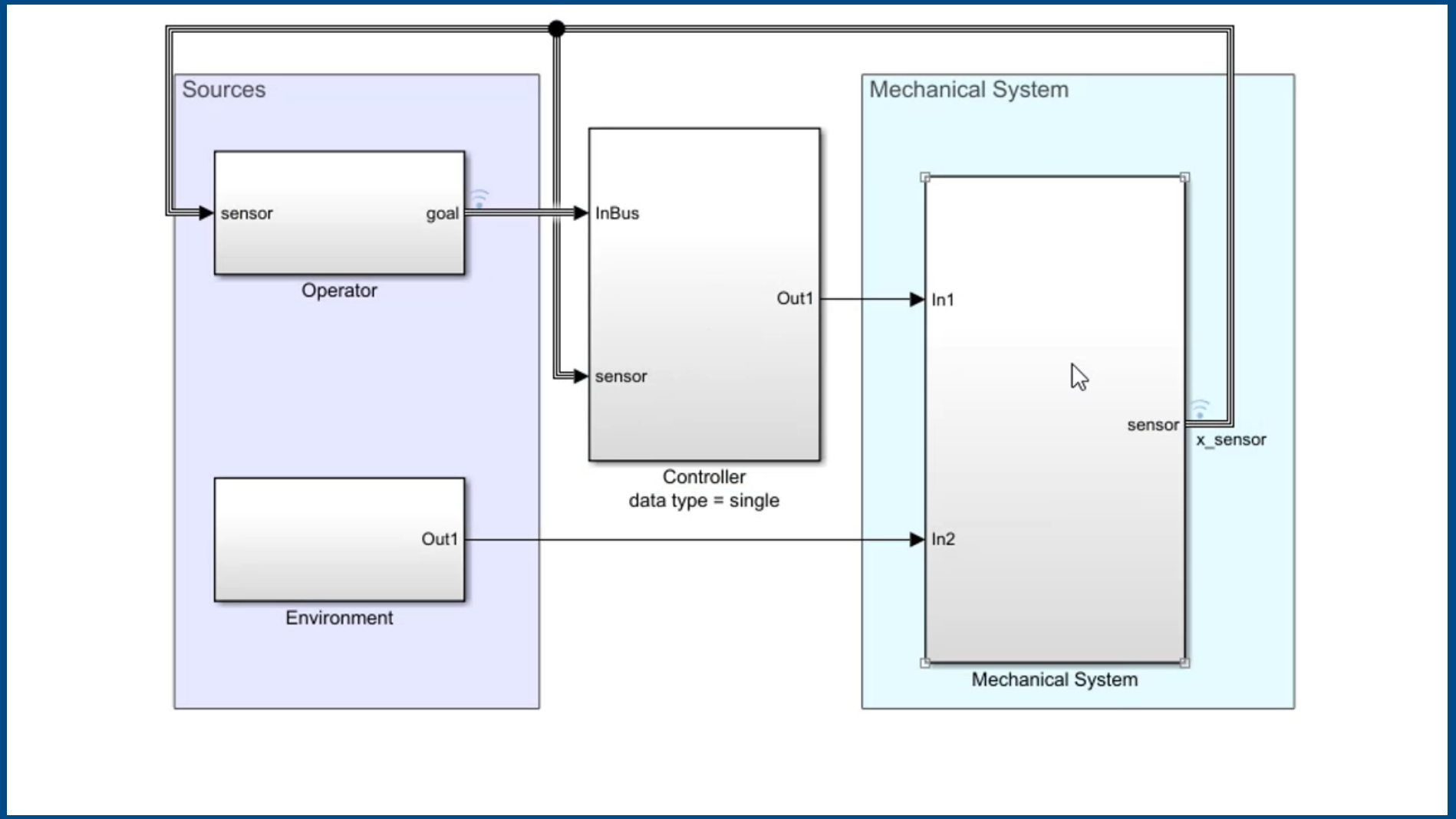
Adding New Blocks



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ssc_dcmotor/DC Motor *

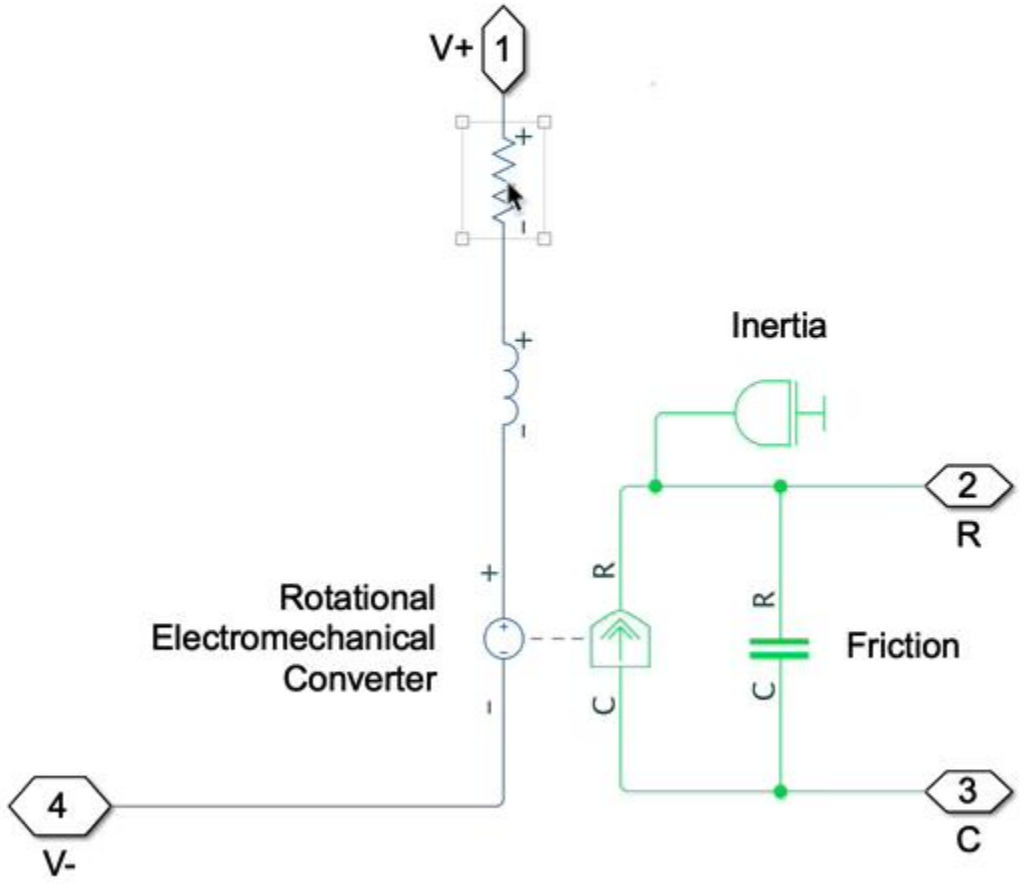
SIMULATION | DEBUG | MODELING | FORMAT | APPS

Format Painter | Screenshot | Show Markup | Auto Arrange | Fonts for Model | Background | Foreground | Shadow

COPY & VIEW | LAYOUT | GLOBAL | FONT & PARAGRAPH | STYLE

DC Motor

ssc_dcmotor ▸ 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 | 145% | VariableStepAuto

ssc_dcmotor/DC Motor *

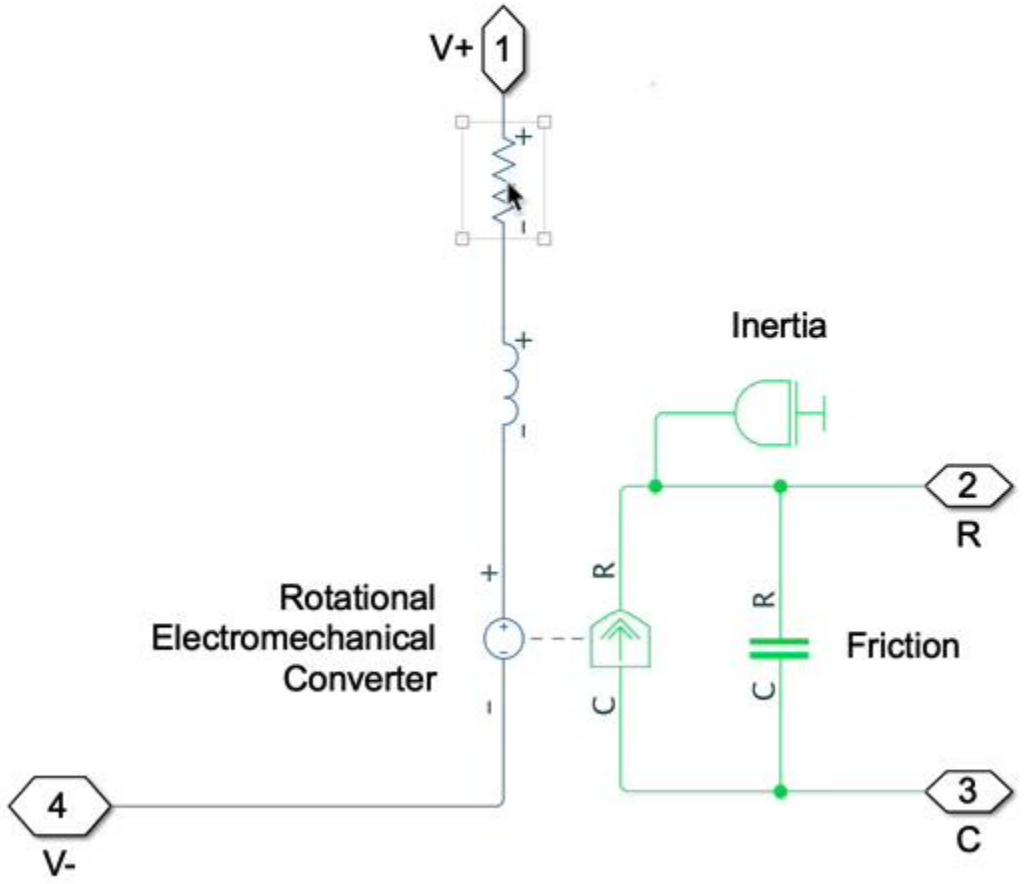
SIMULATION | DEBUG | MODELING | FORMAT | APPS

Format Painter | Screenshot | Show Markup | Auto Arrange | Fonts for Model | Background | Foreground | Shadow

COPY & VIEW | LAYOUT | GLOBAL | FONT & PARAGRAPH | STYLE

DC Motor

ssc_dcmotor ▸ 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 | 145% | VariableStepAuto

sldemo_antiwindup *

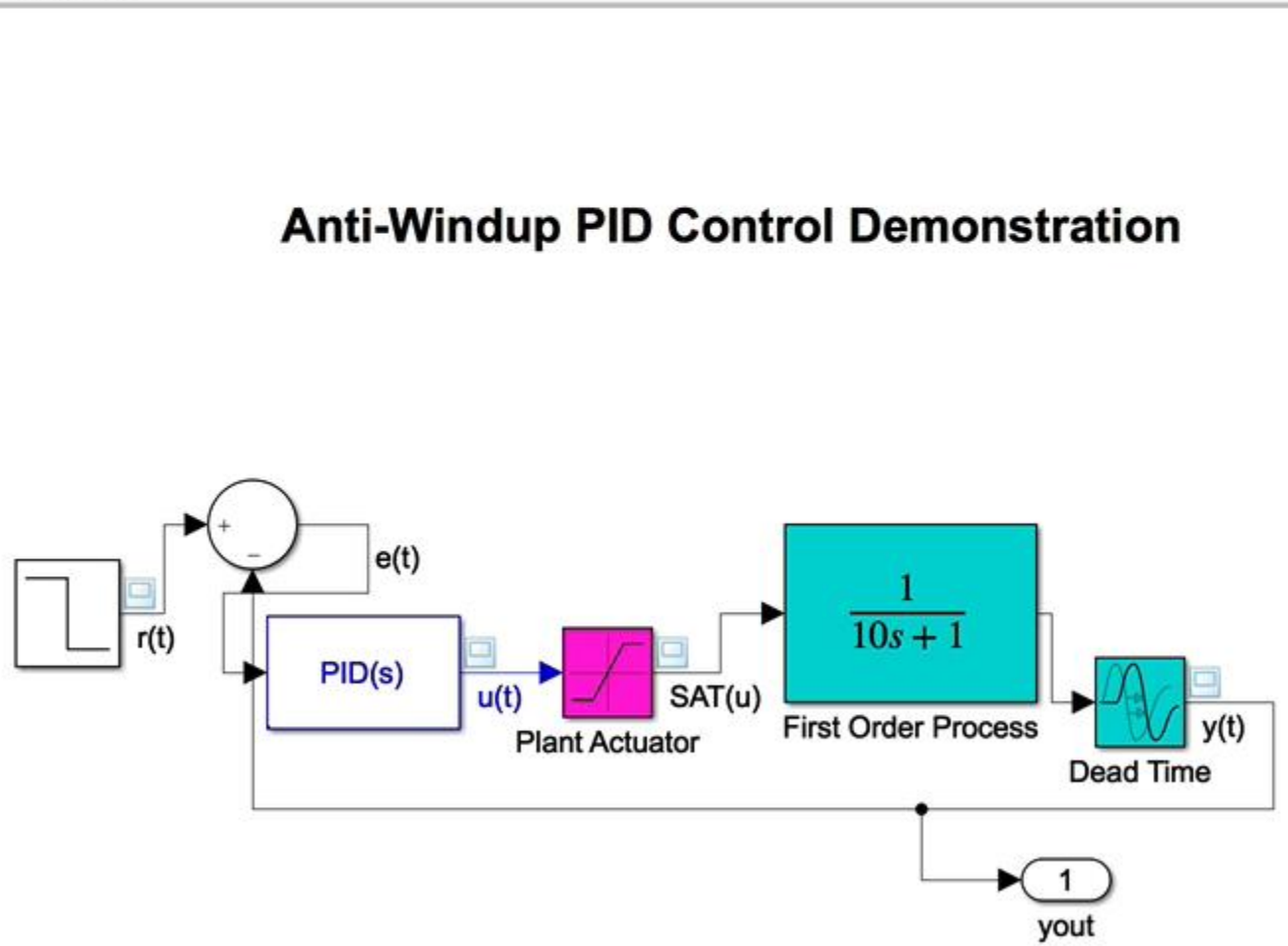
SIMULATION | DEBUG | MODELING | FORMAT | APPS

Format Painter | Screenshot | Show Markup | Auto Arrange | Fonts for Model | Background | Foreground | Shadow

COPY & VIEW | LAYOUT | GLOBAL | FONT & PARAGRAPH | STYLE

sldemo_antiwindup

sldemo_antiwindup



Ready | 150% | ode3

Componentisation

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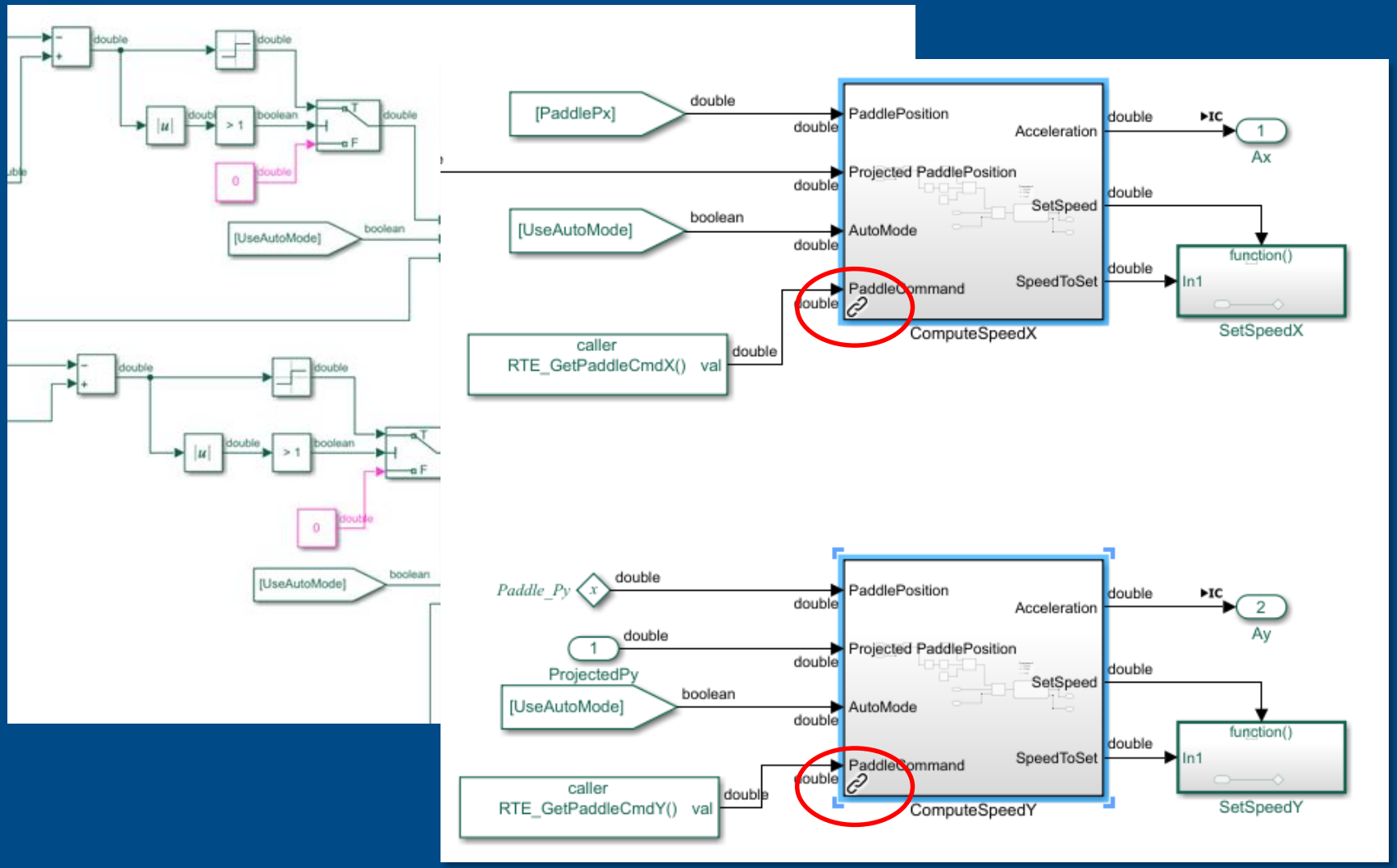
Use libraries to share rarely changing *utilities* across models and projects



Less duplication

More readable

More efficient

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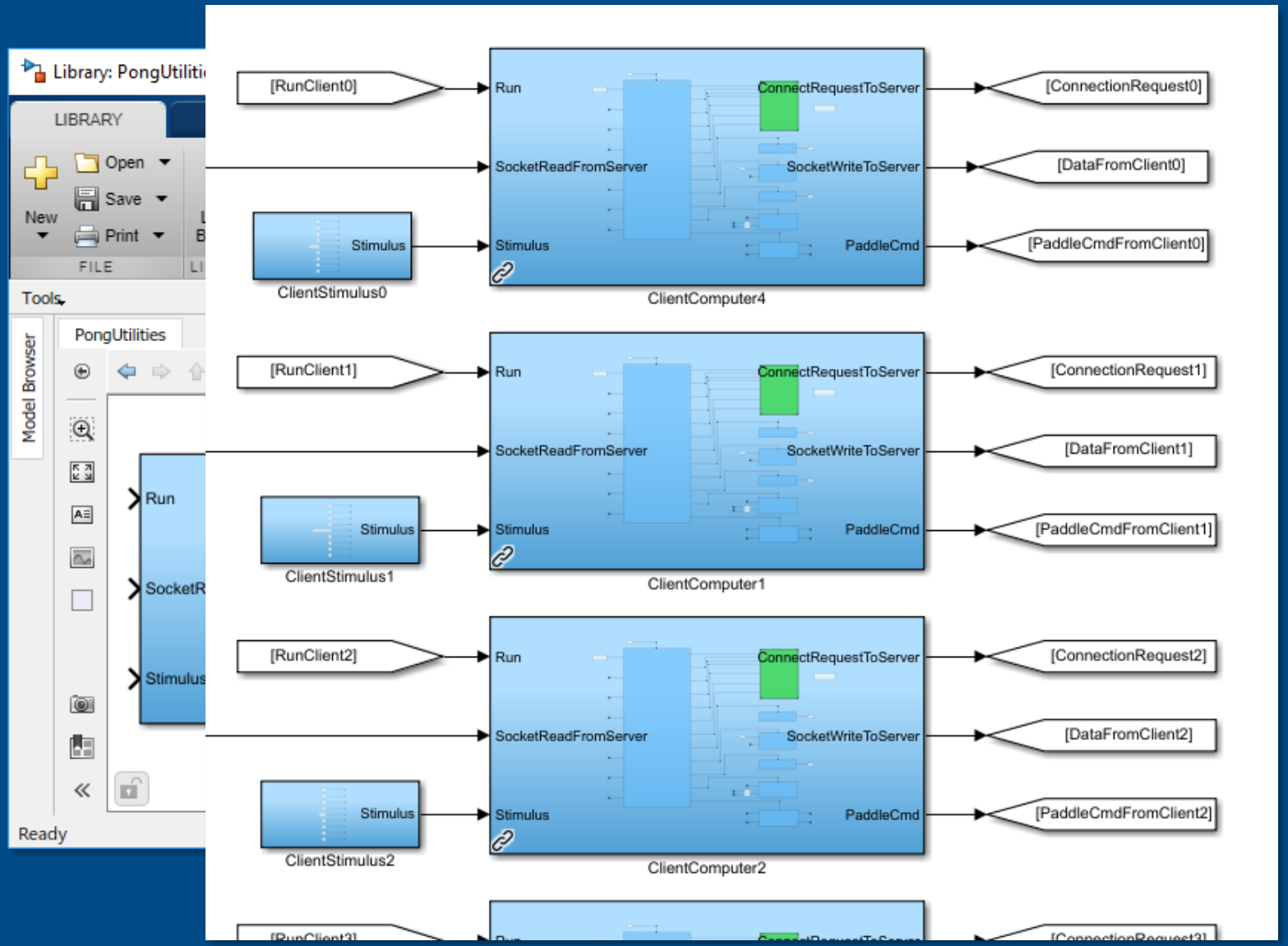

How do you edit the library block?

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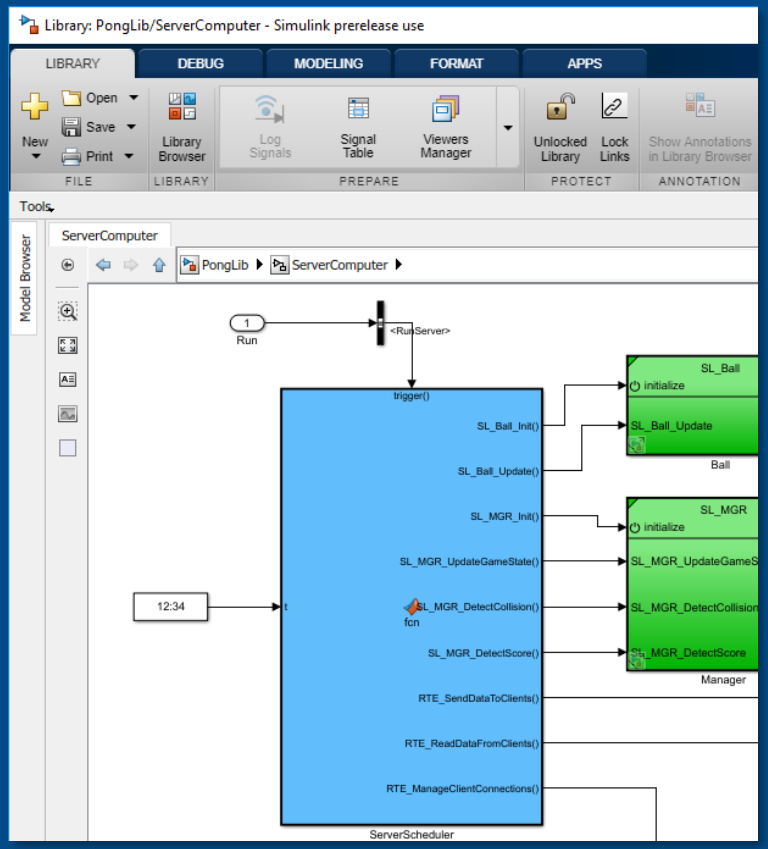
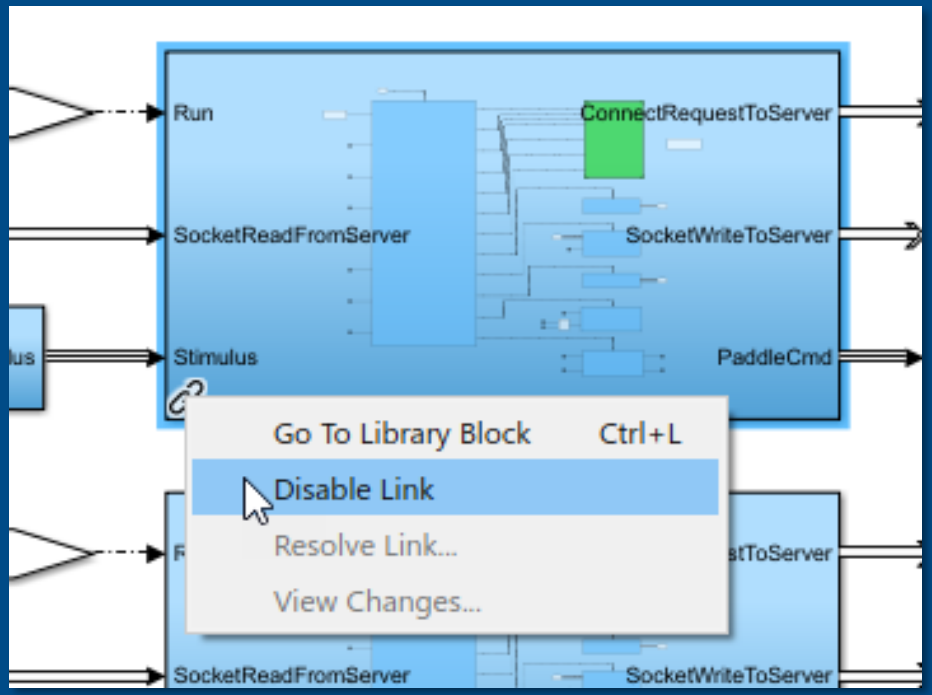
Editing design components in libraries



Edit library directly?



Edit link in-context?

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Subsystem Reference

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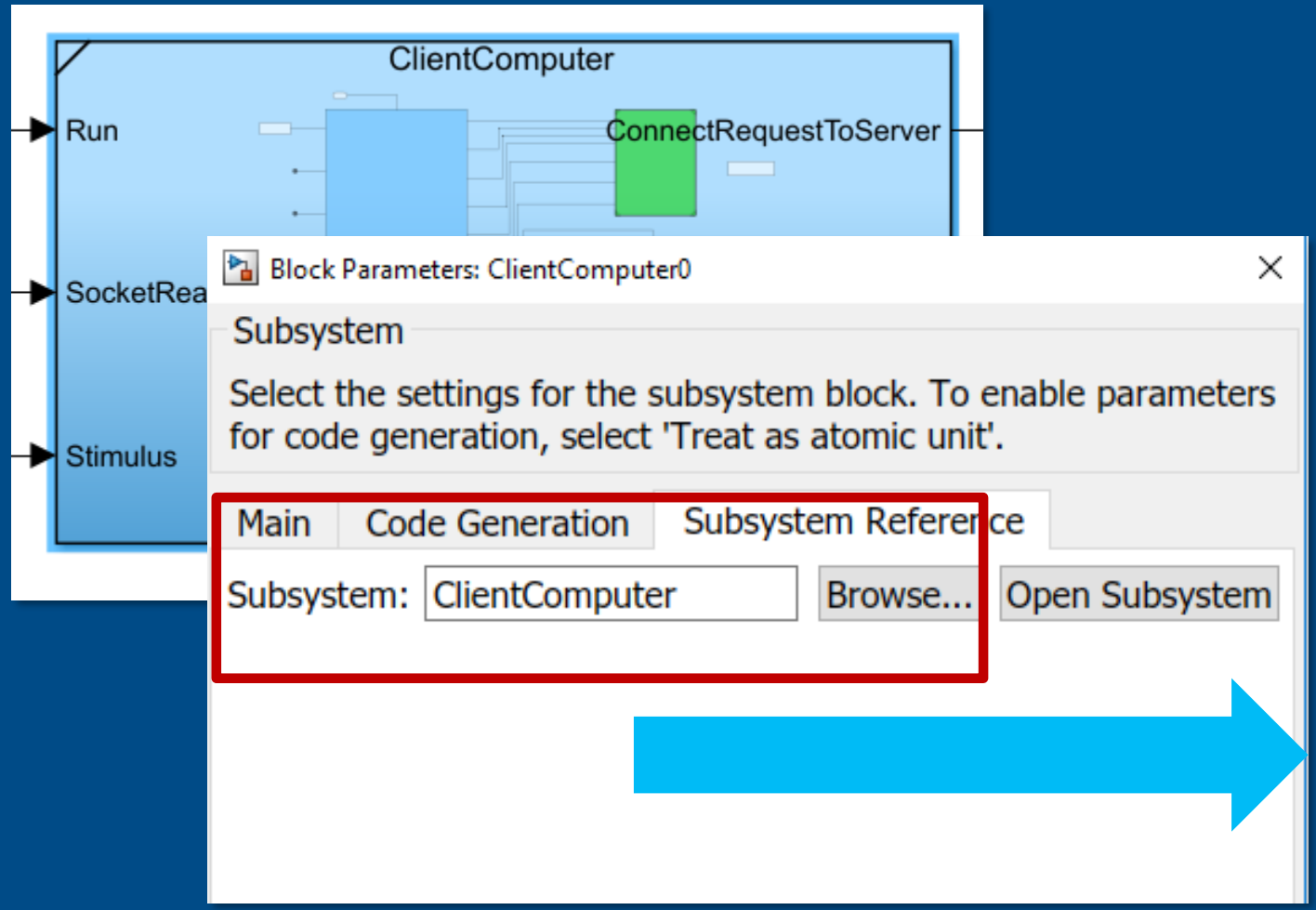

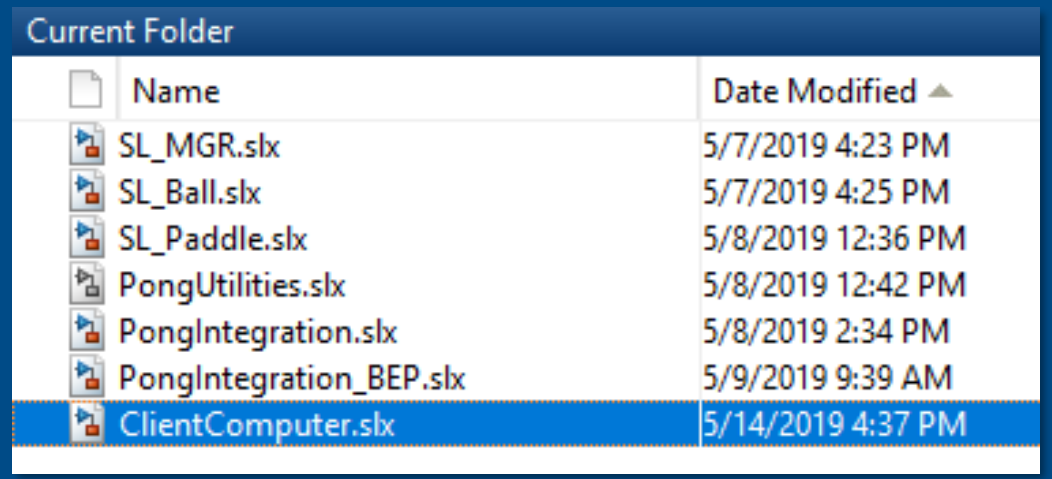

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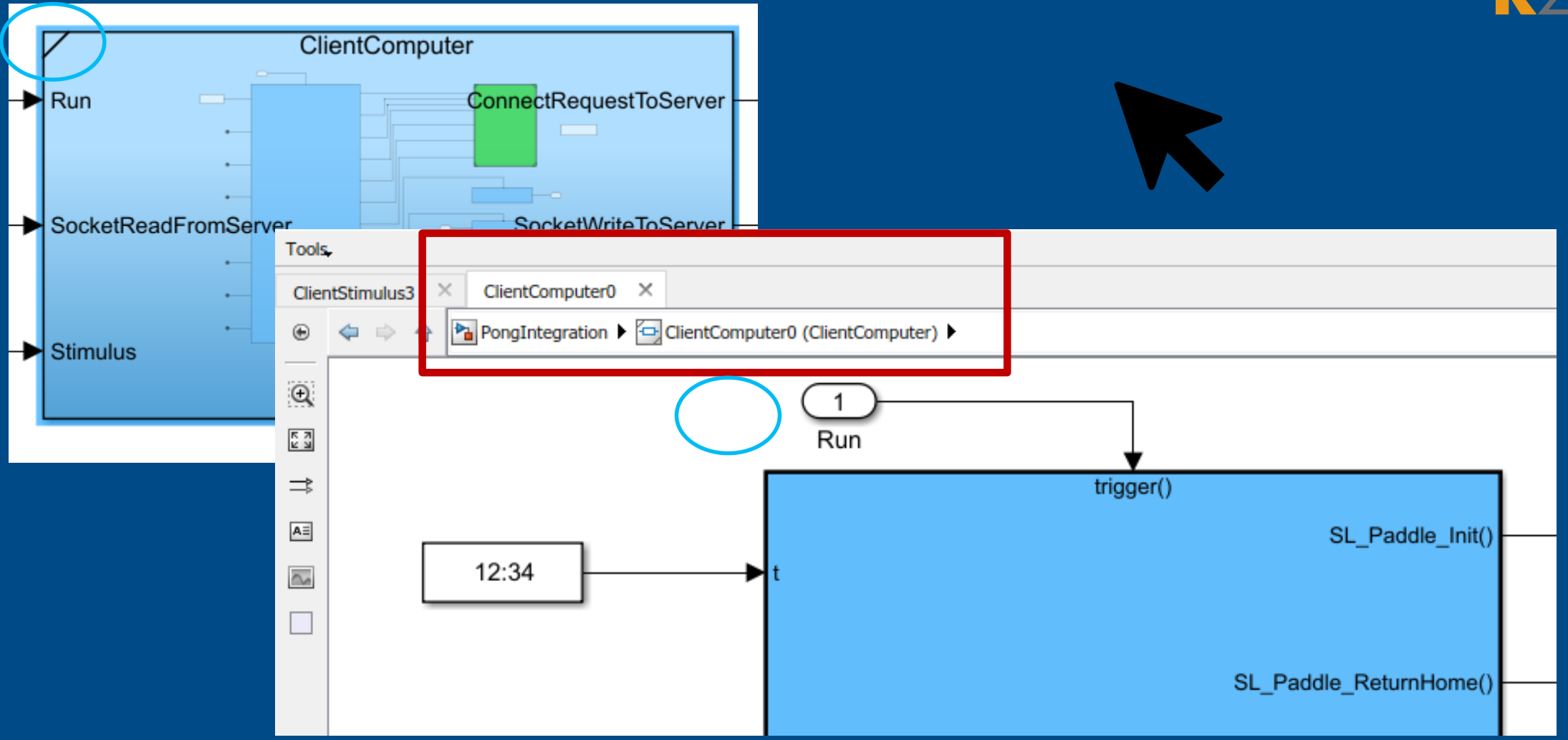
Subsystem Reference

R2019b



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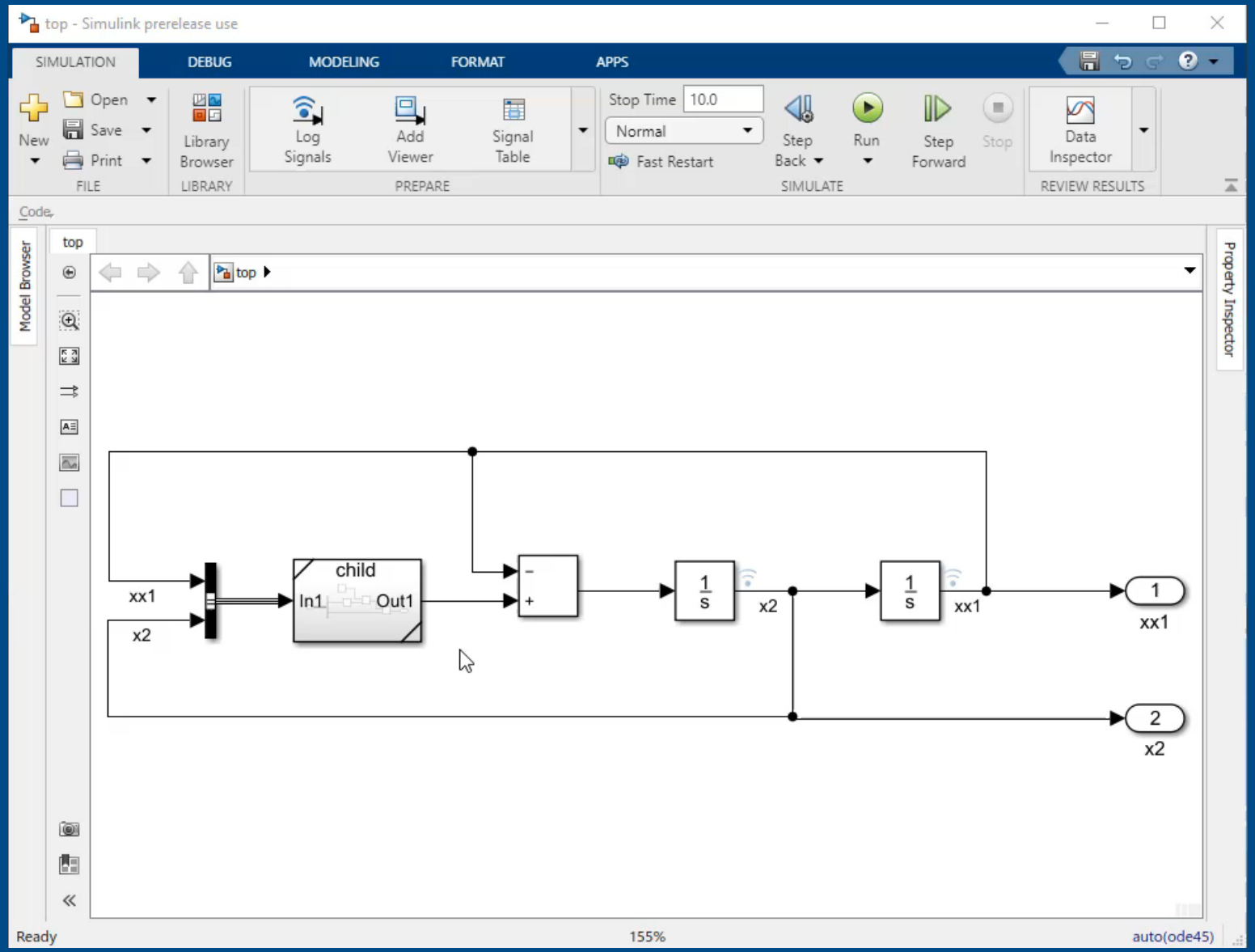
Subsystem Reference



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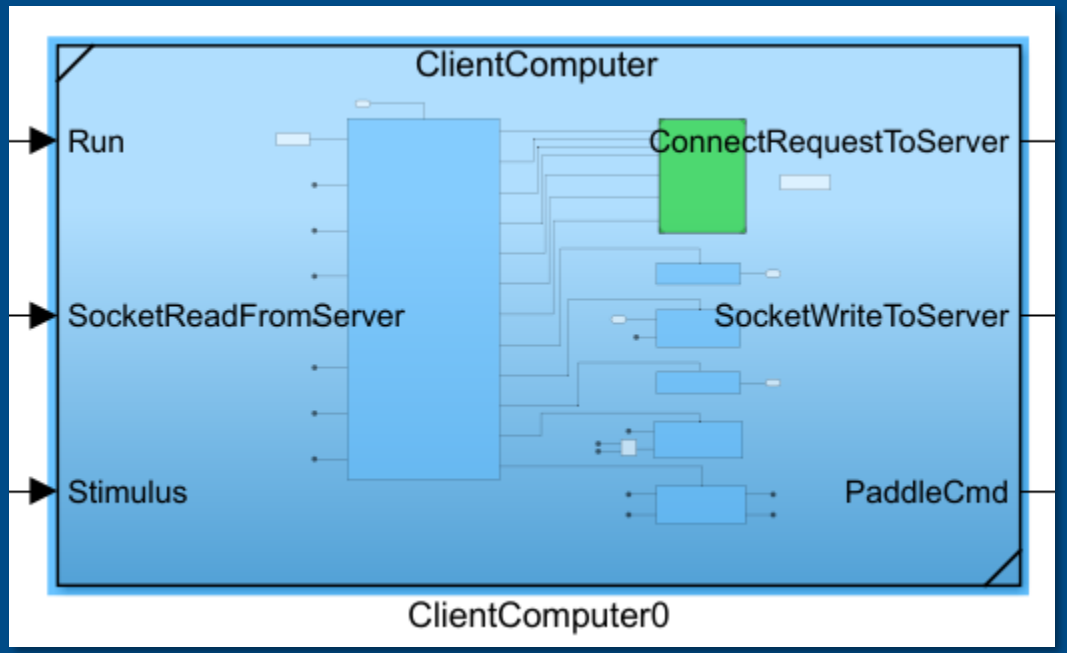
Subsystem Reference componentizes your model into separate files

R2019b



Reduce file contention

Edit in-context without links

Automatic synchronization

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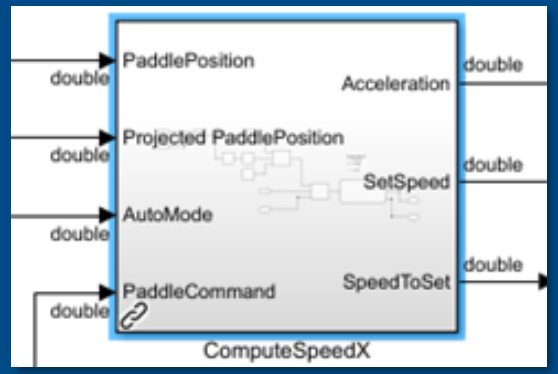
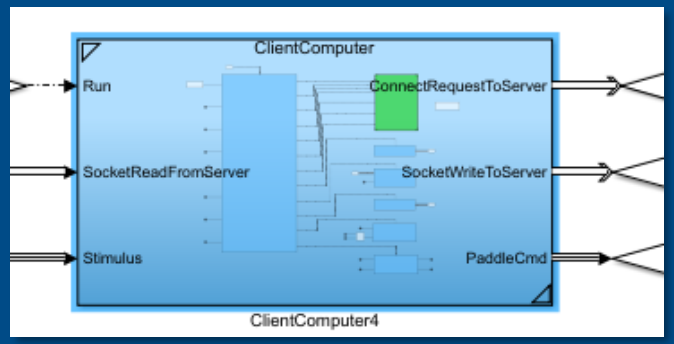
Summary of componentization techniques



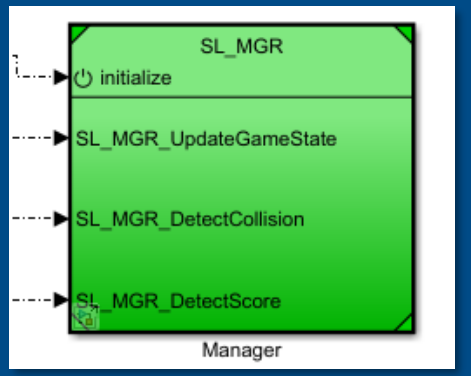
Libraries

- Graphical reuse
- **Dynamic** interface
- Ideal for utilities & blocksets



Subsystem Reference

- Graphical reuse
- **Dynamic** interface
- Ideal for storing design model components



Model Reference

- Behaviour reuse
- **Defined** interface
- Ideal for code generation components

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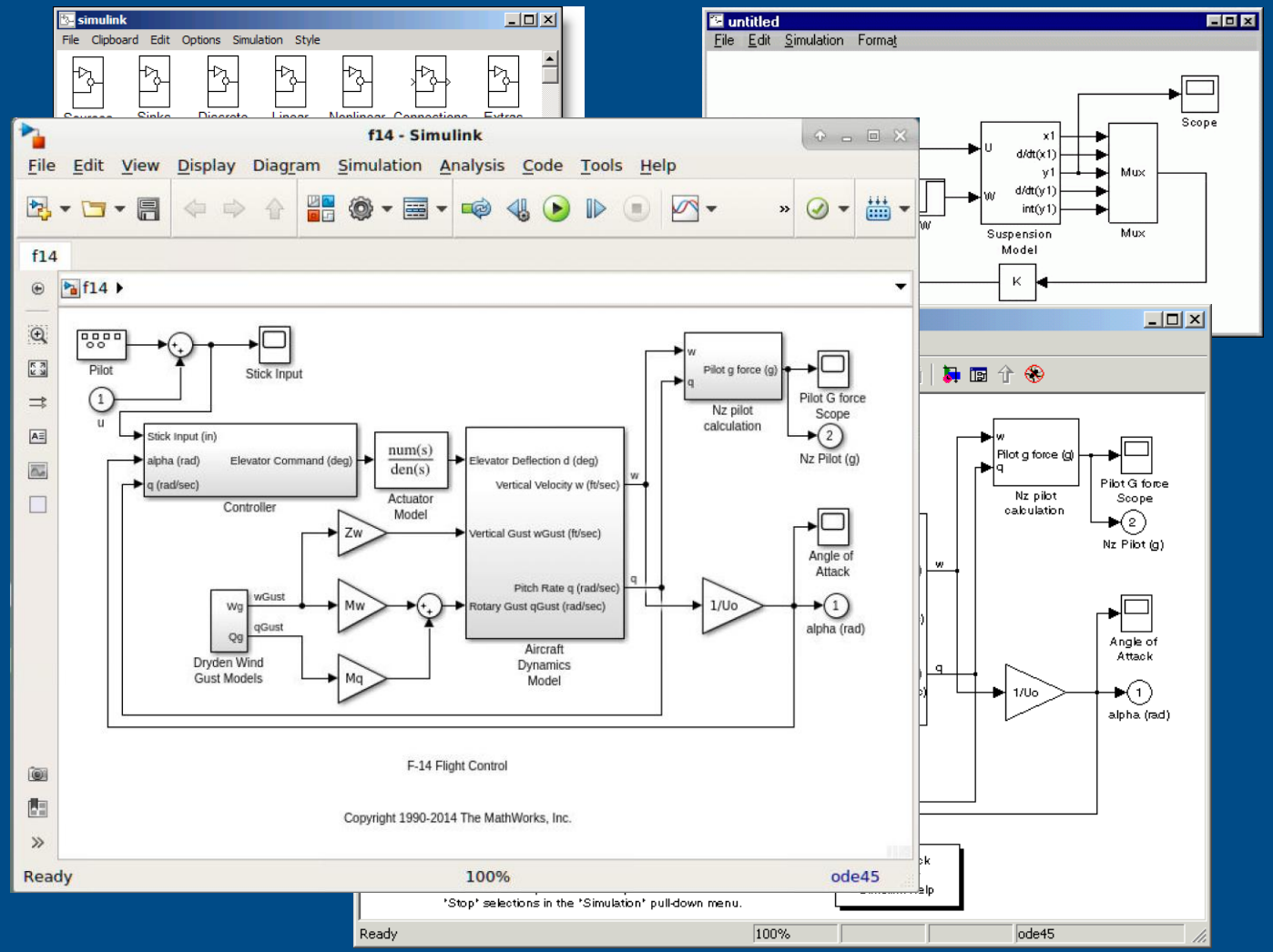
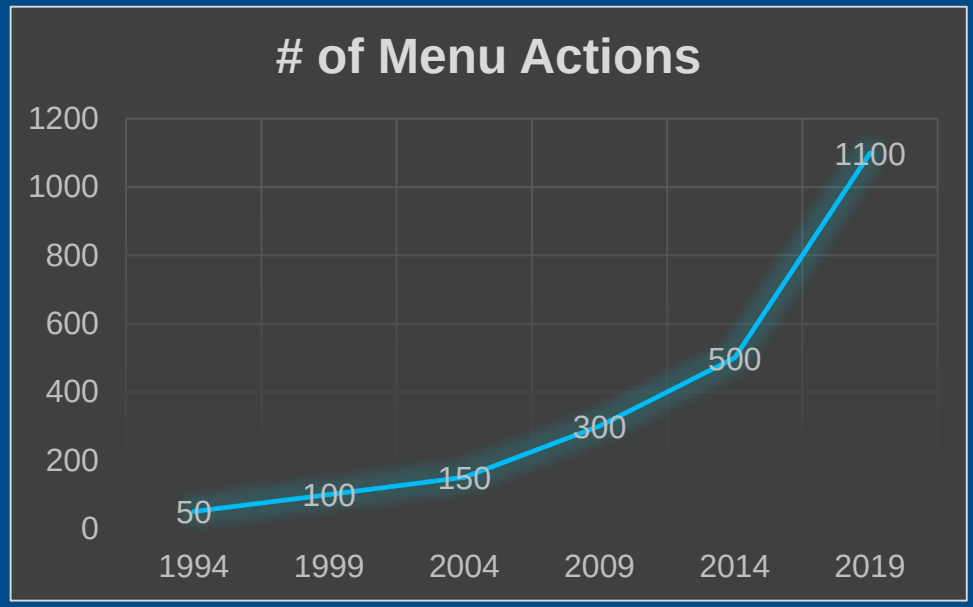
Simulink has grown in capability





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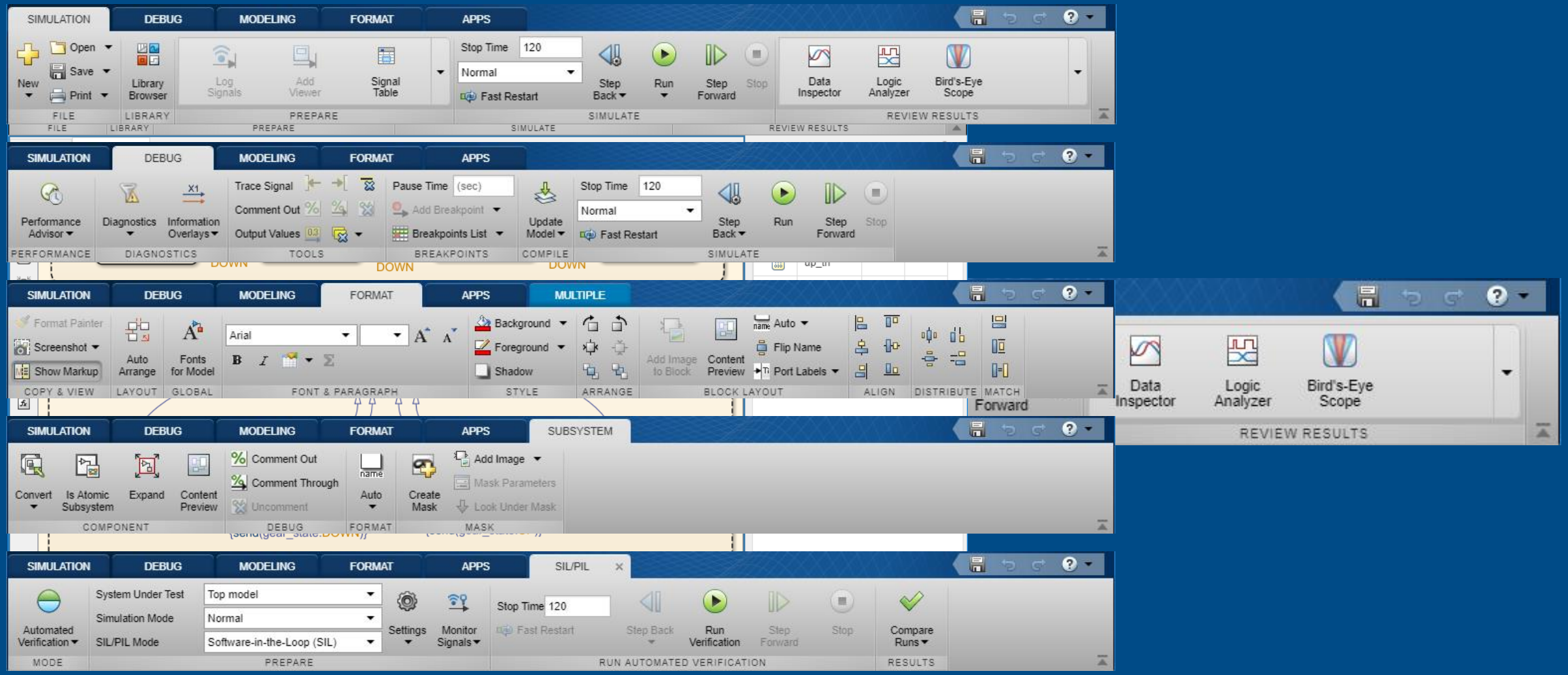
Introducing the Simulink Toolstrip



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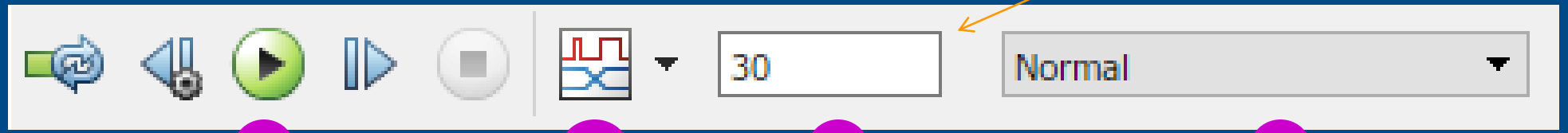
Improved Commands Discoverability & Workflow

Basic Simulation workflow

Controls have no labels.
What do they do?

Toolbar



3 4 1 2

What is the order of steps
In workflow?

Toolstrip

1 2 3 4

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Selection-based Filtering

Format tab automatically adds/removes sections based on current selection on canvas

SELECTED

Simulink Canvas

Block

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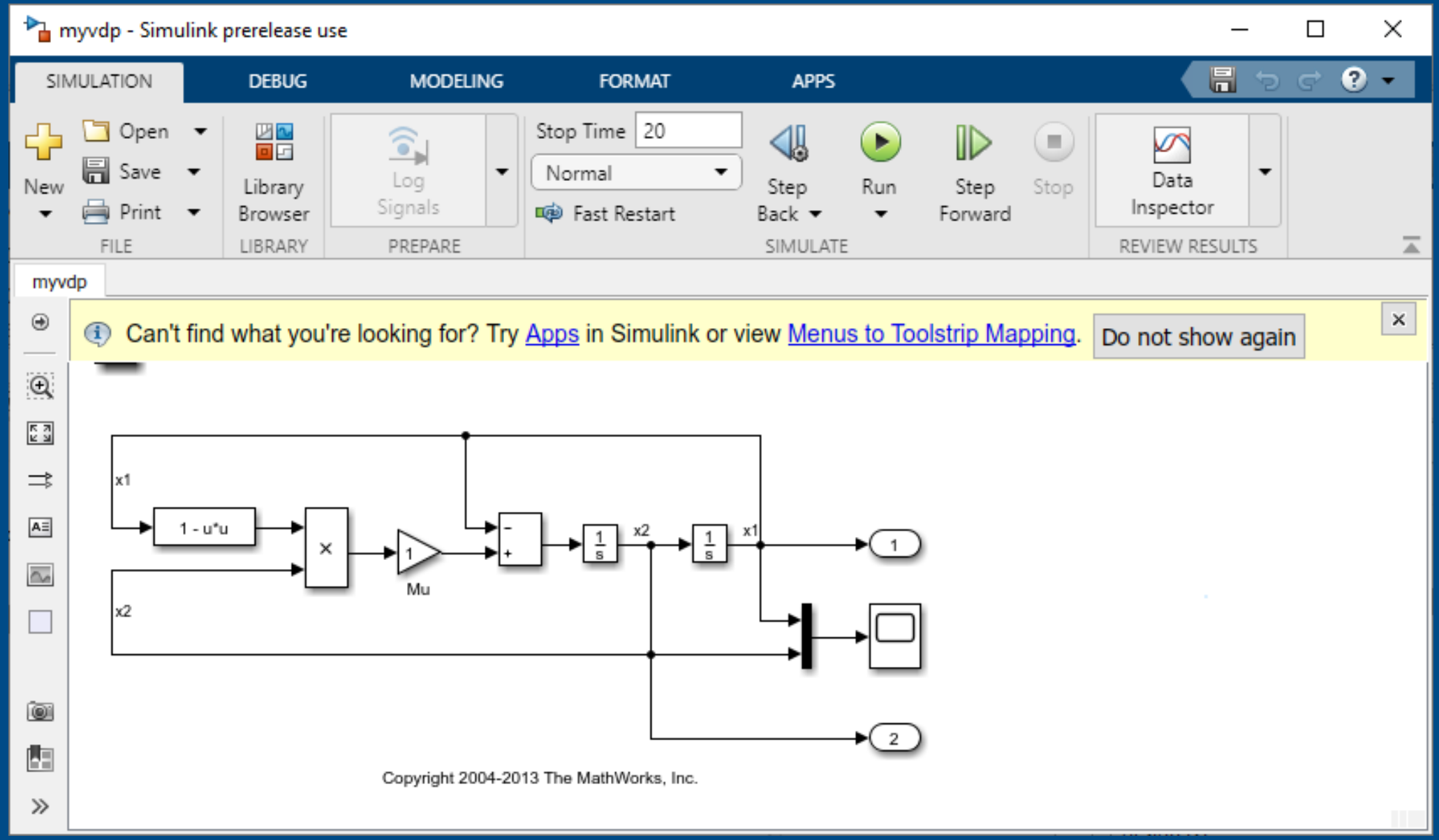

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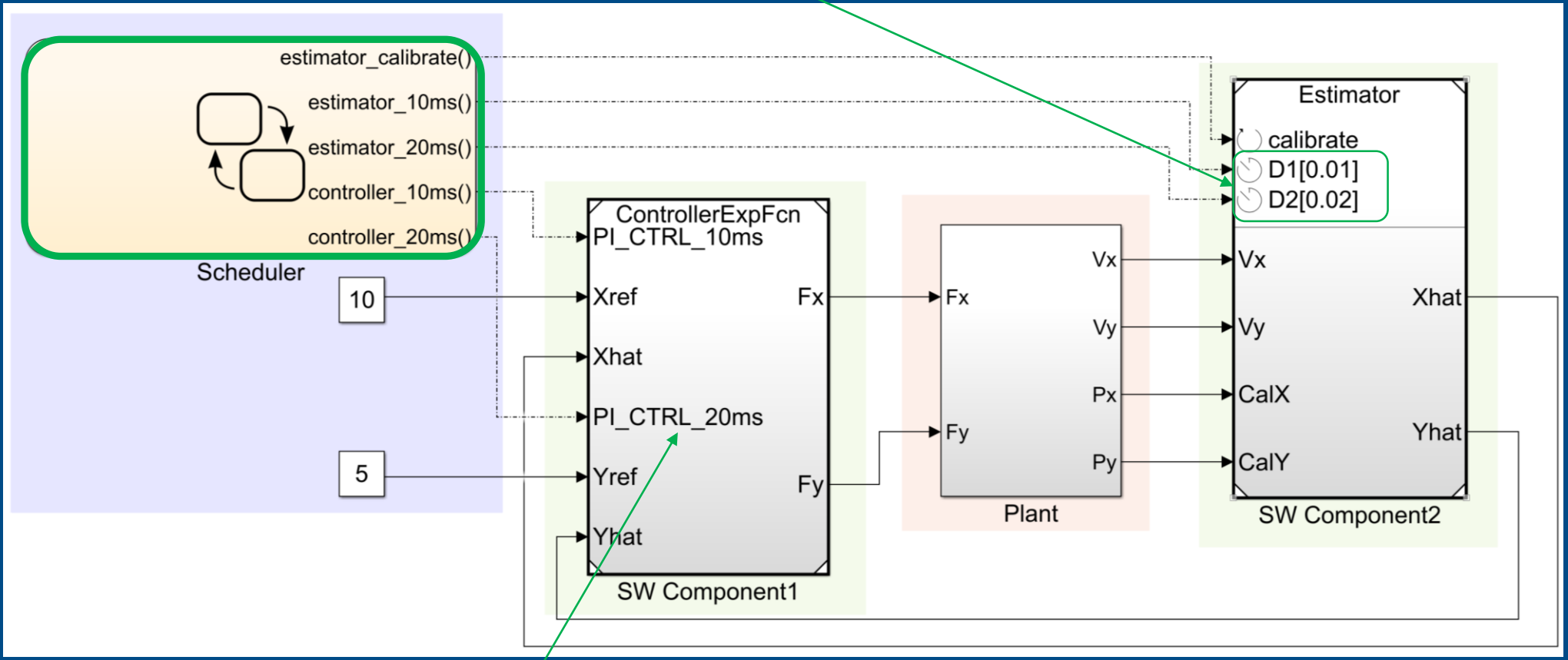
Controlling the Execution of Model Components

Schedulable Rate-Based Model



Export Function Model

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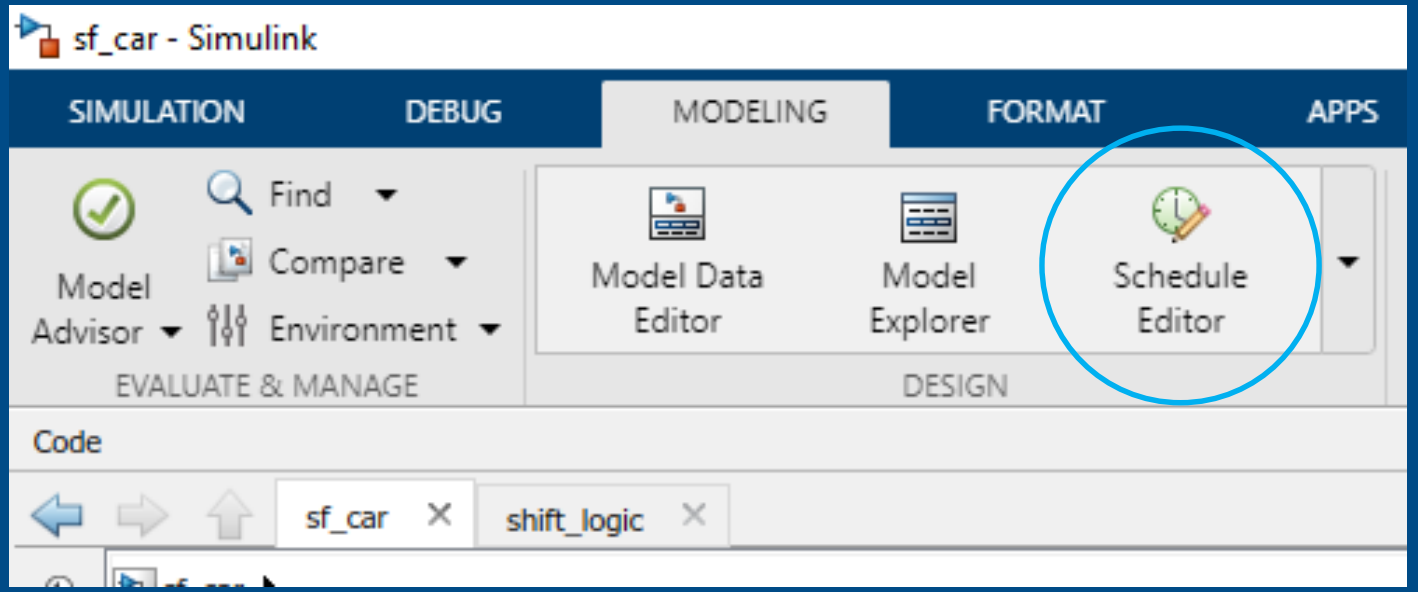

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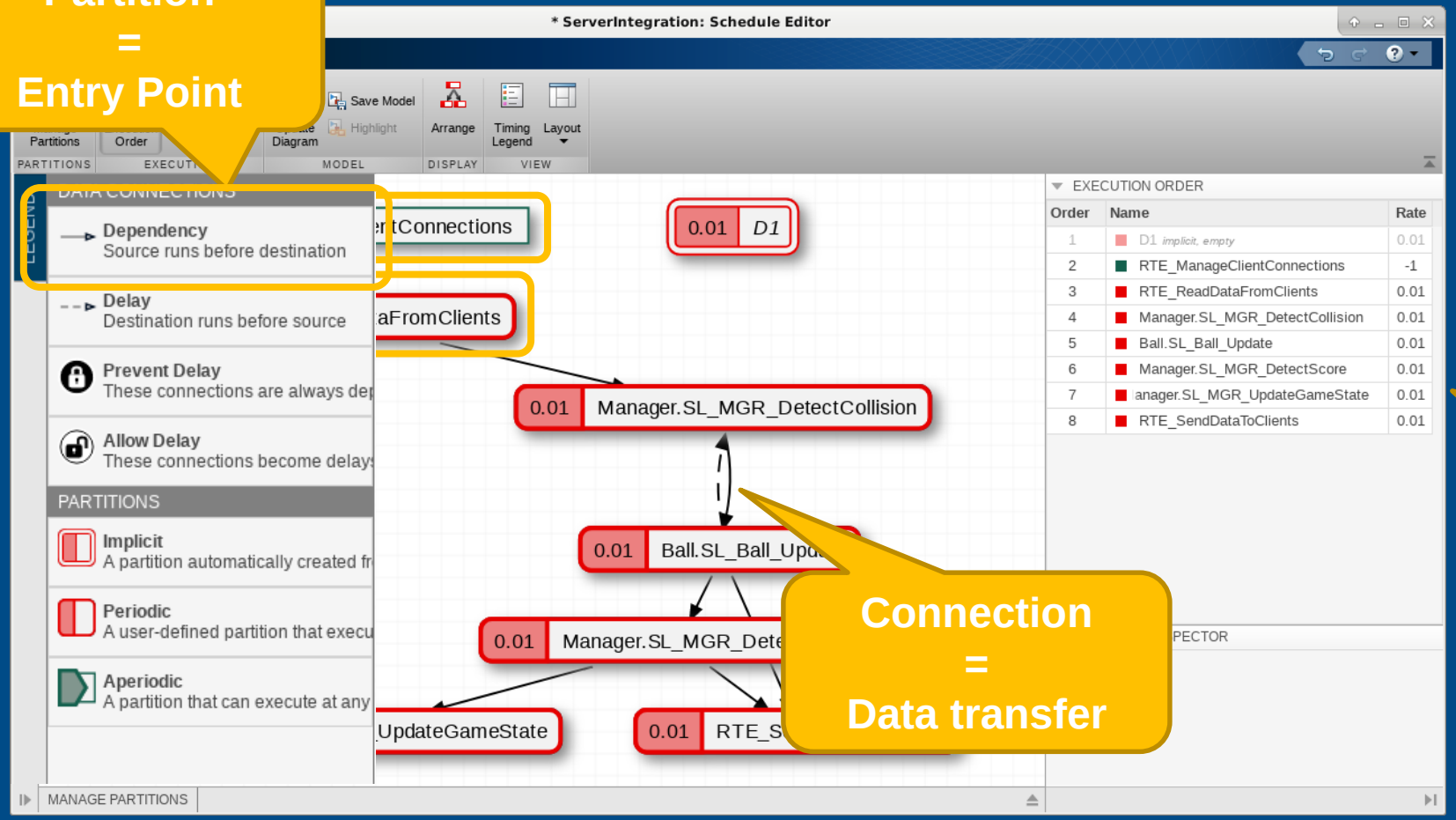
Schedule Editor

R2019a

Partition = Entry Point



Execution order

Connection = Data transfer

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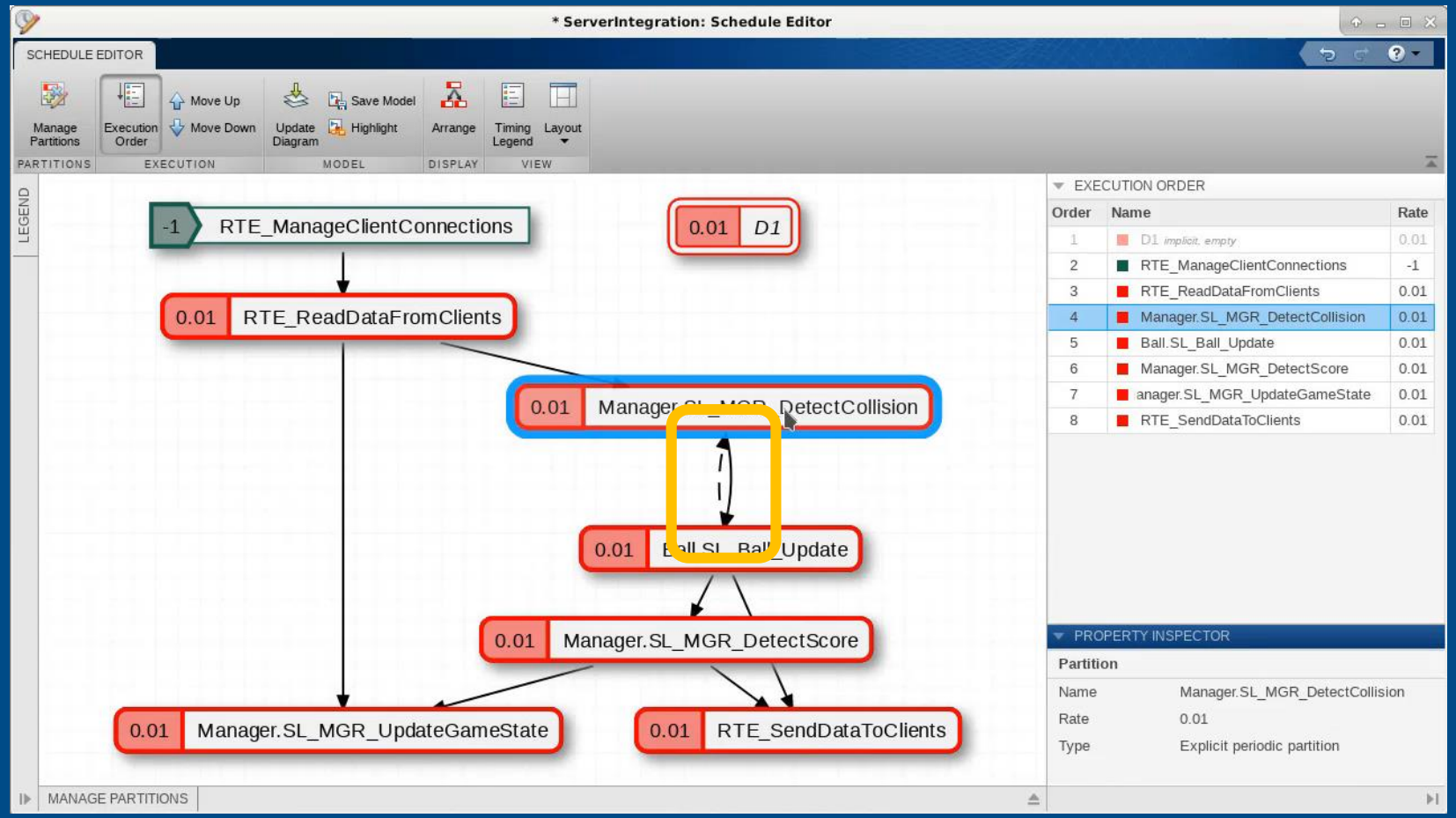
Change the schedule easily

R2019a



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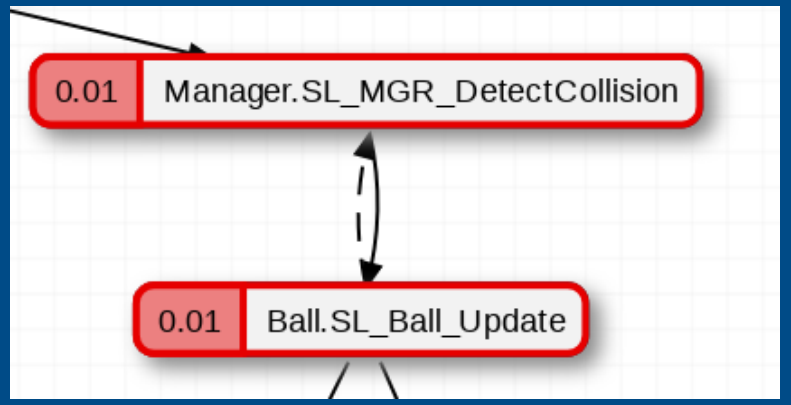
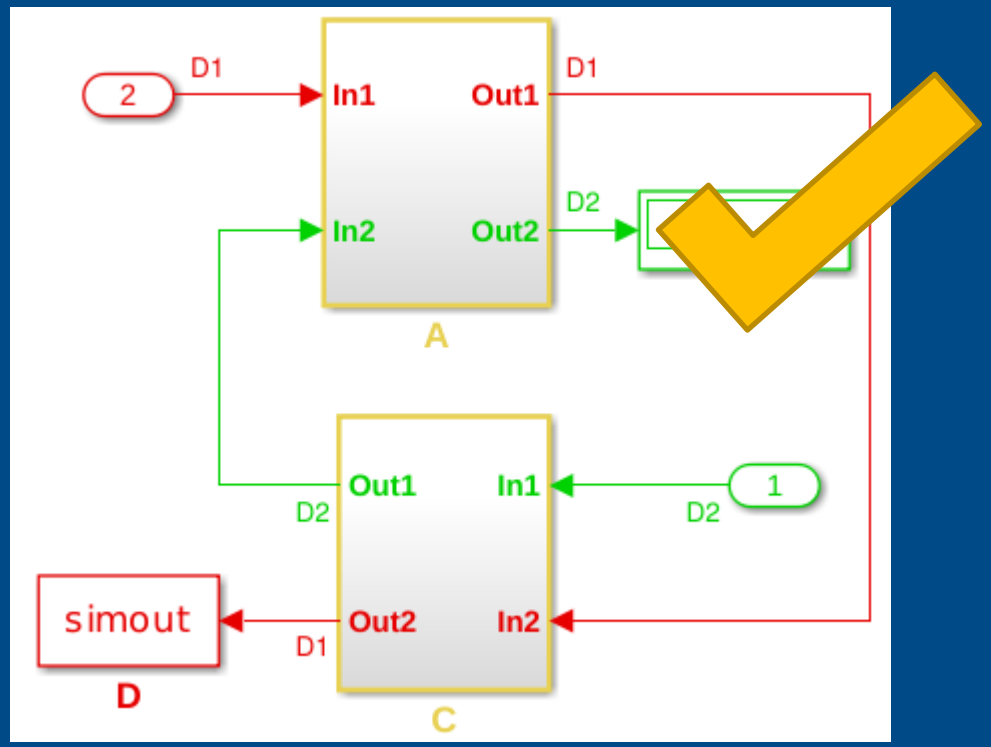
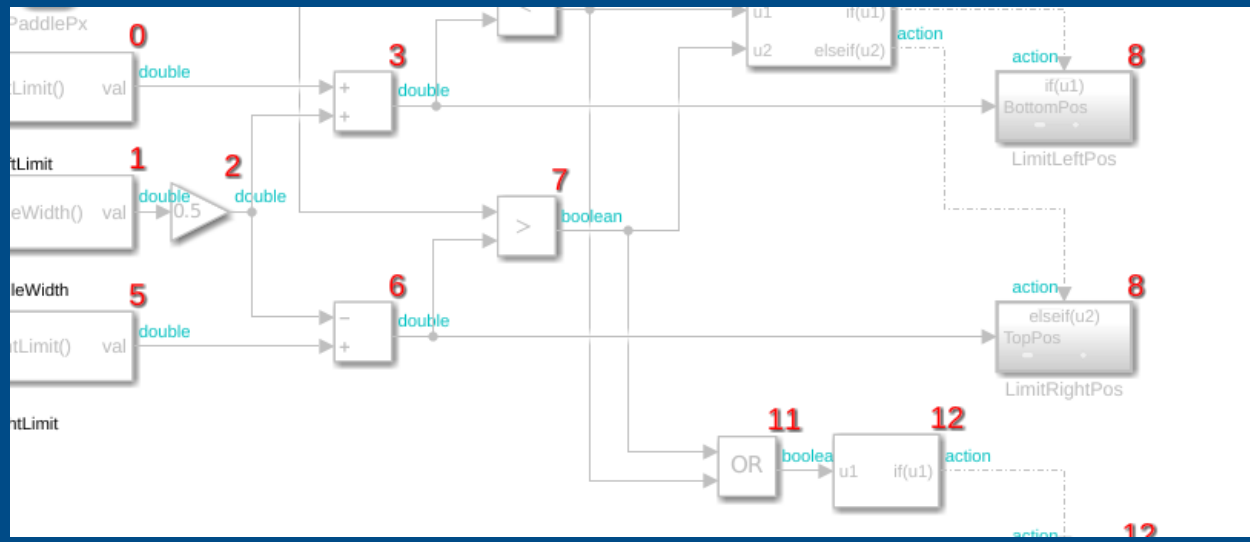




R2019b



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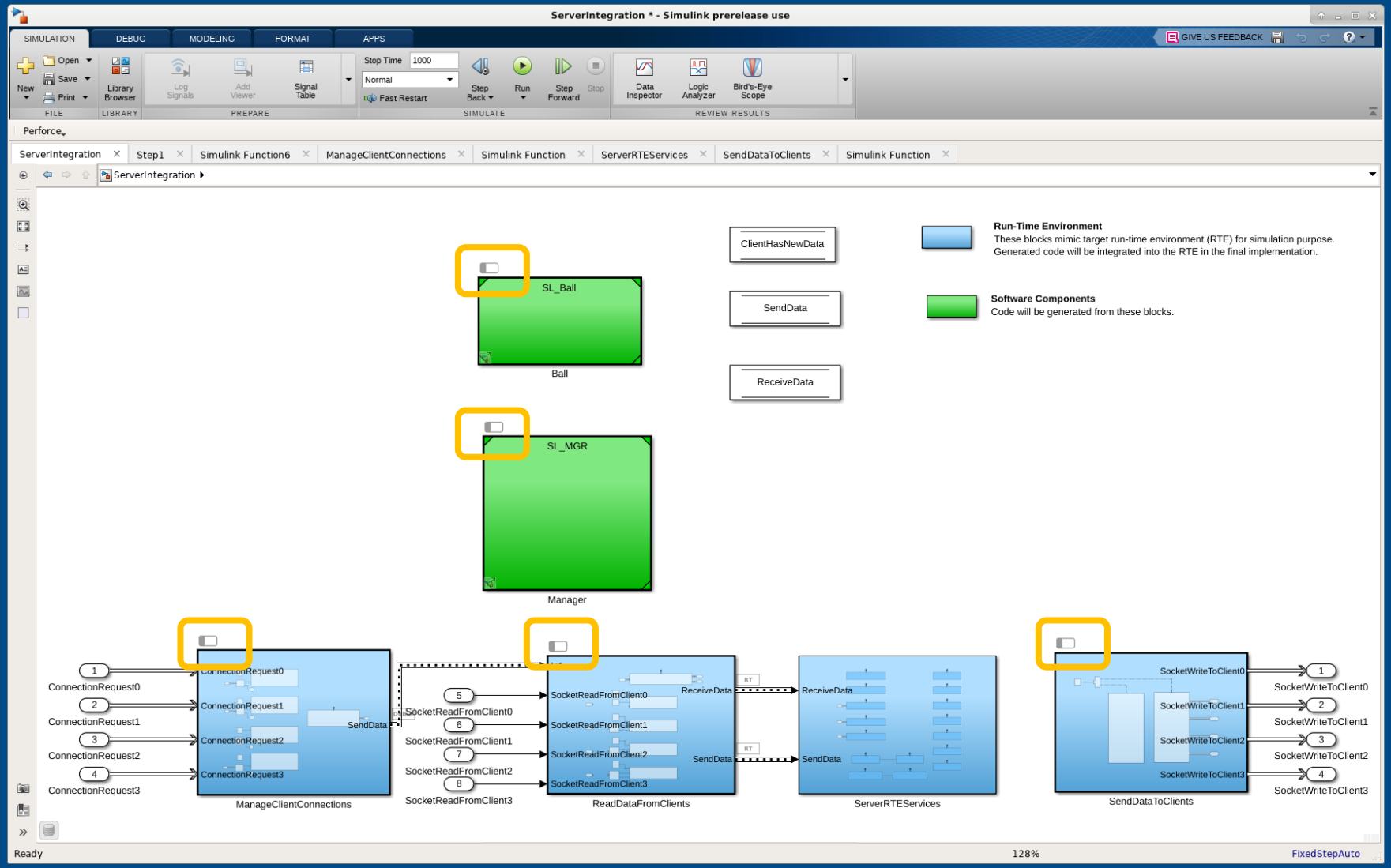
Using the Schedule Editor simplifies your model



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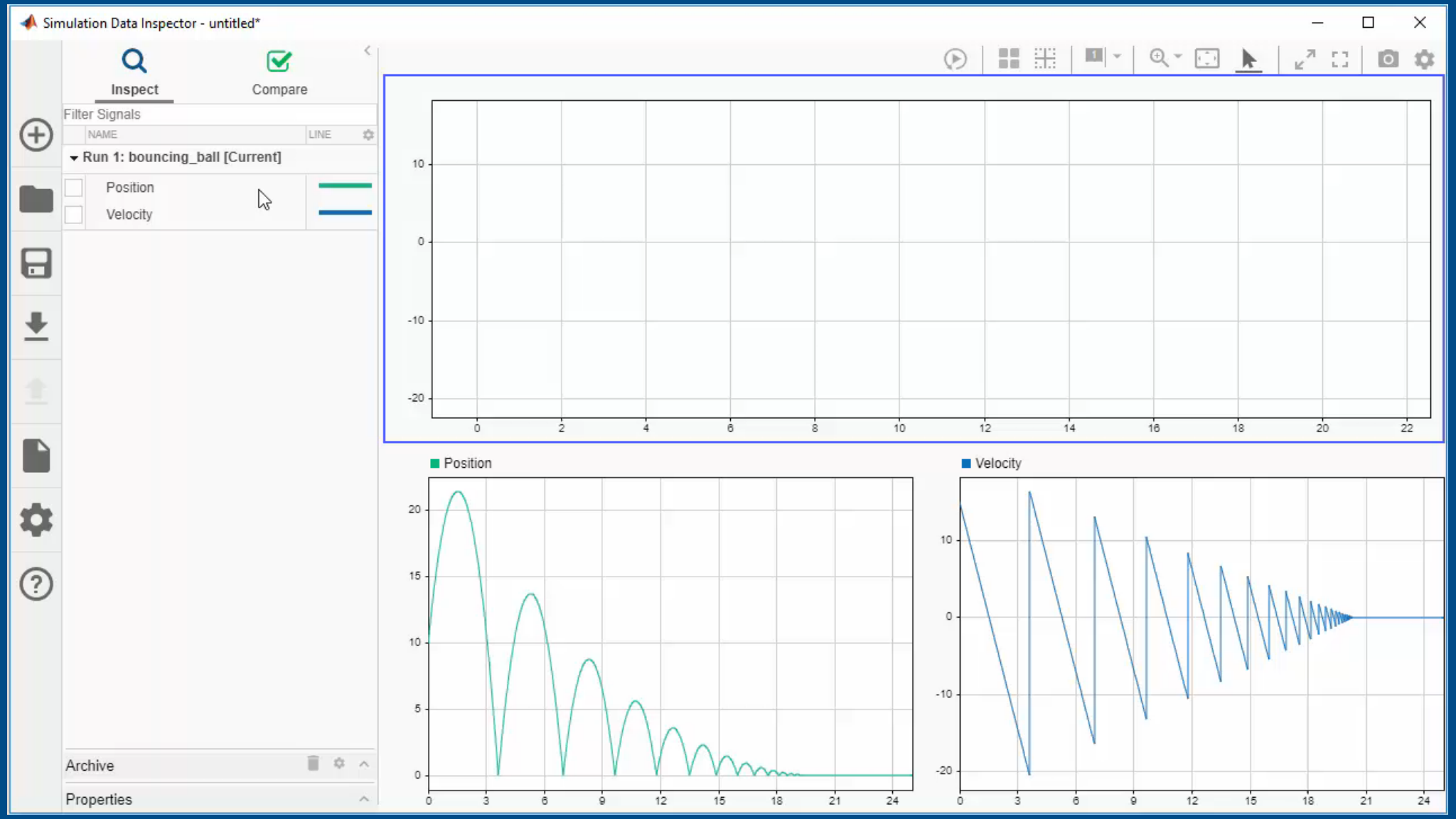
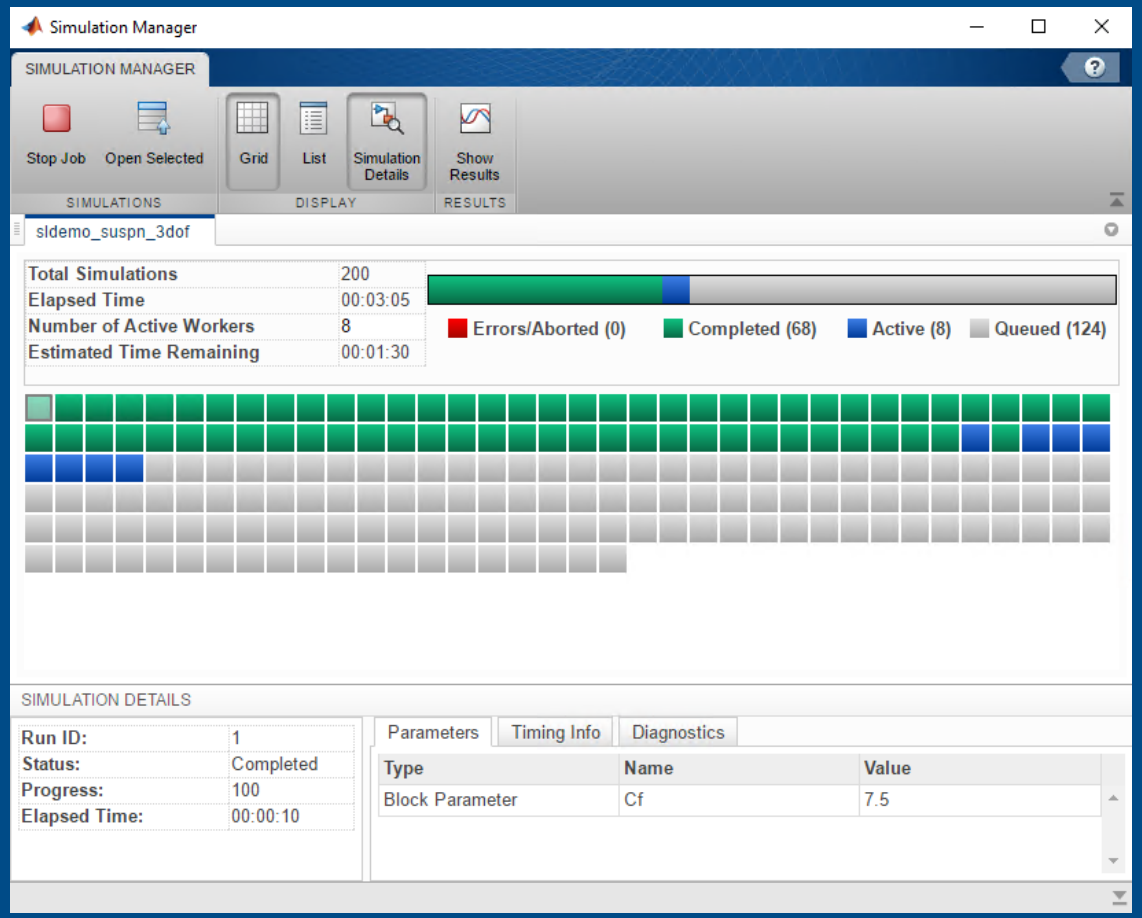
XY Visualization



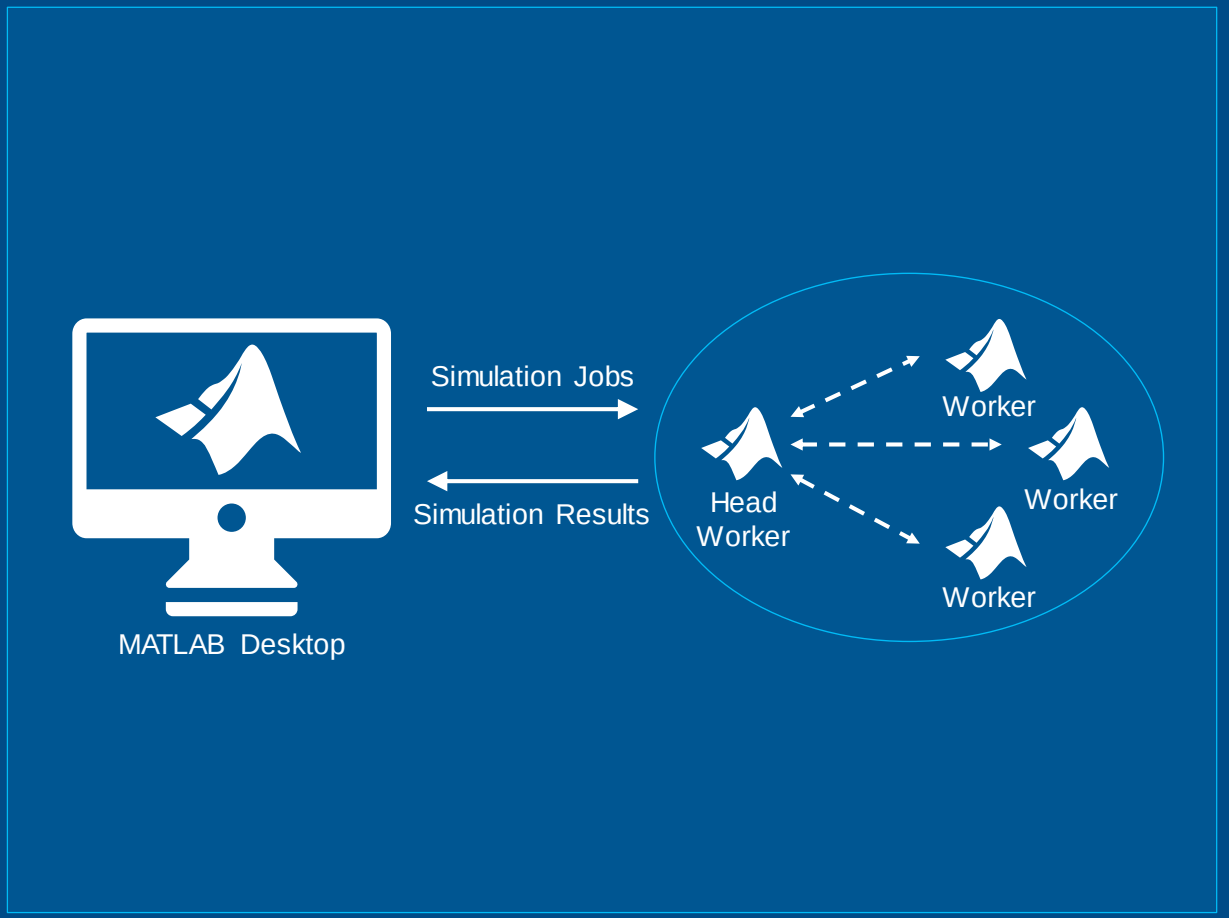
Parallel Simulations in Simulink

Scaling

Simulation Manager



`batchsim`



Simulink
Parallel Computing Toolbox

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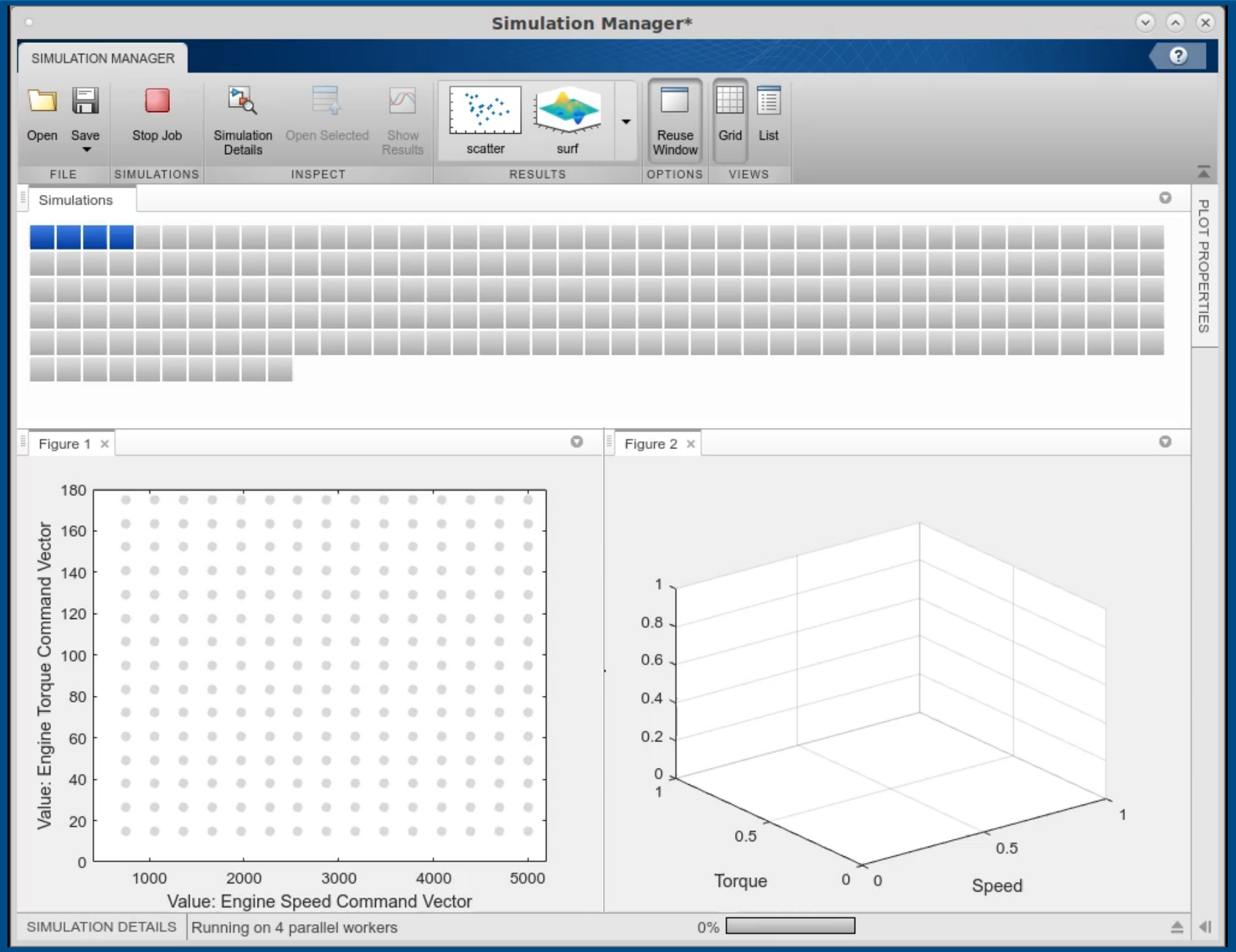

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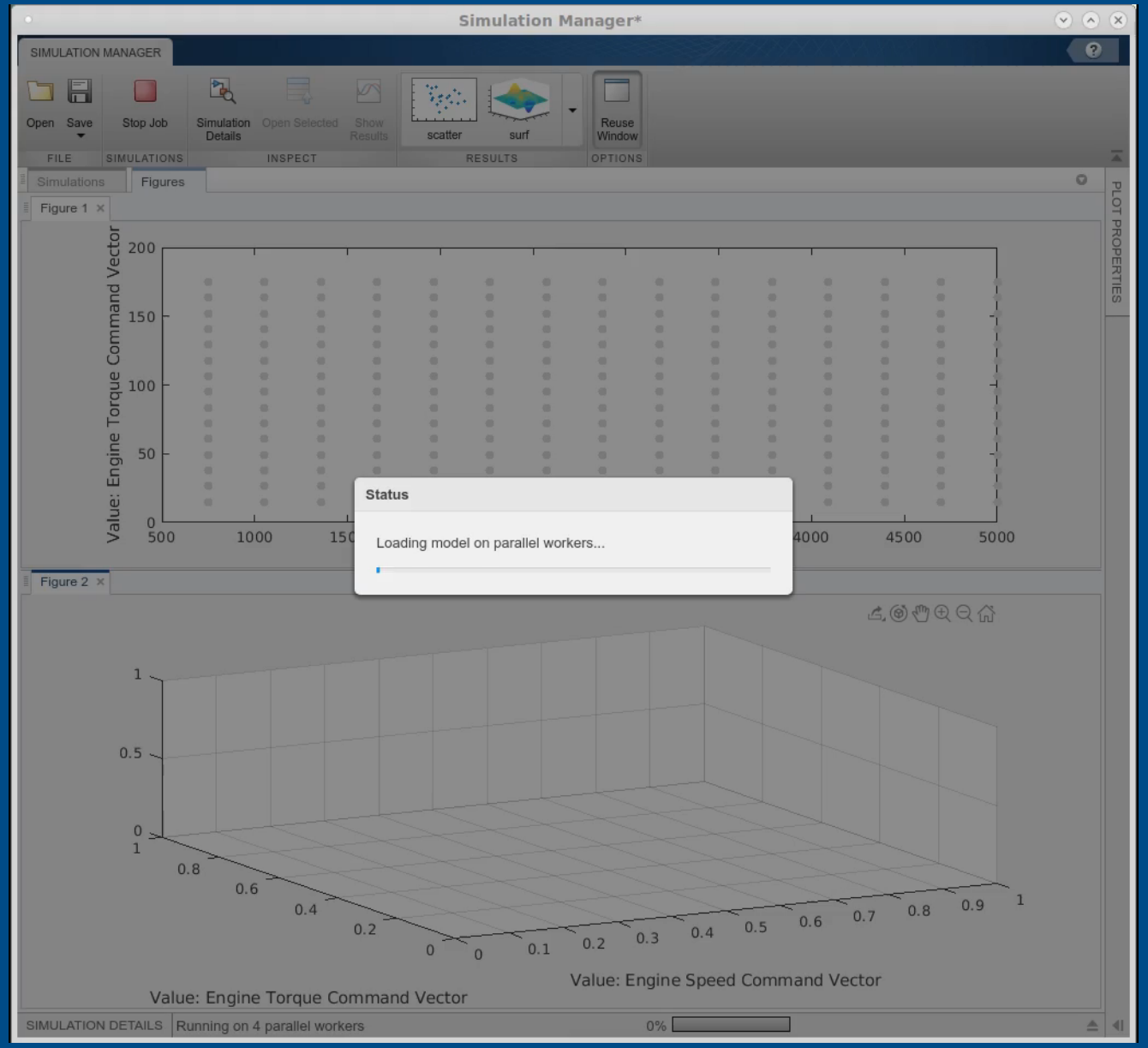
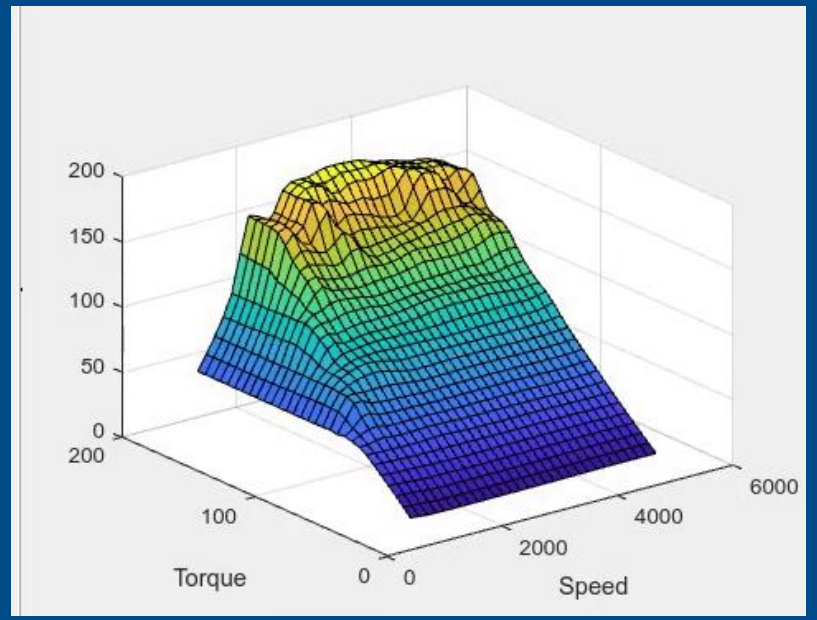
Graphical analysis helps identify failures quickly



R2019b



Expected Plot

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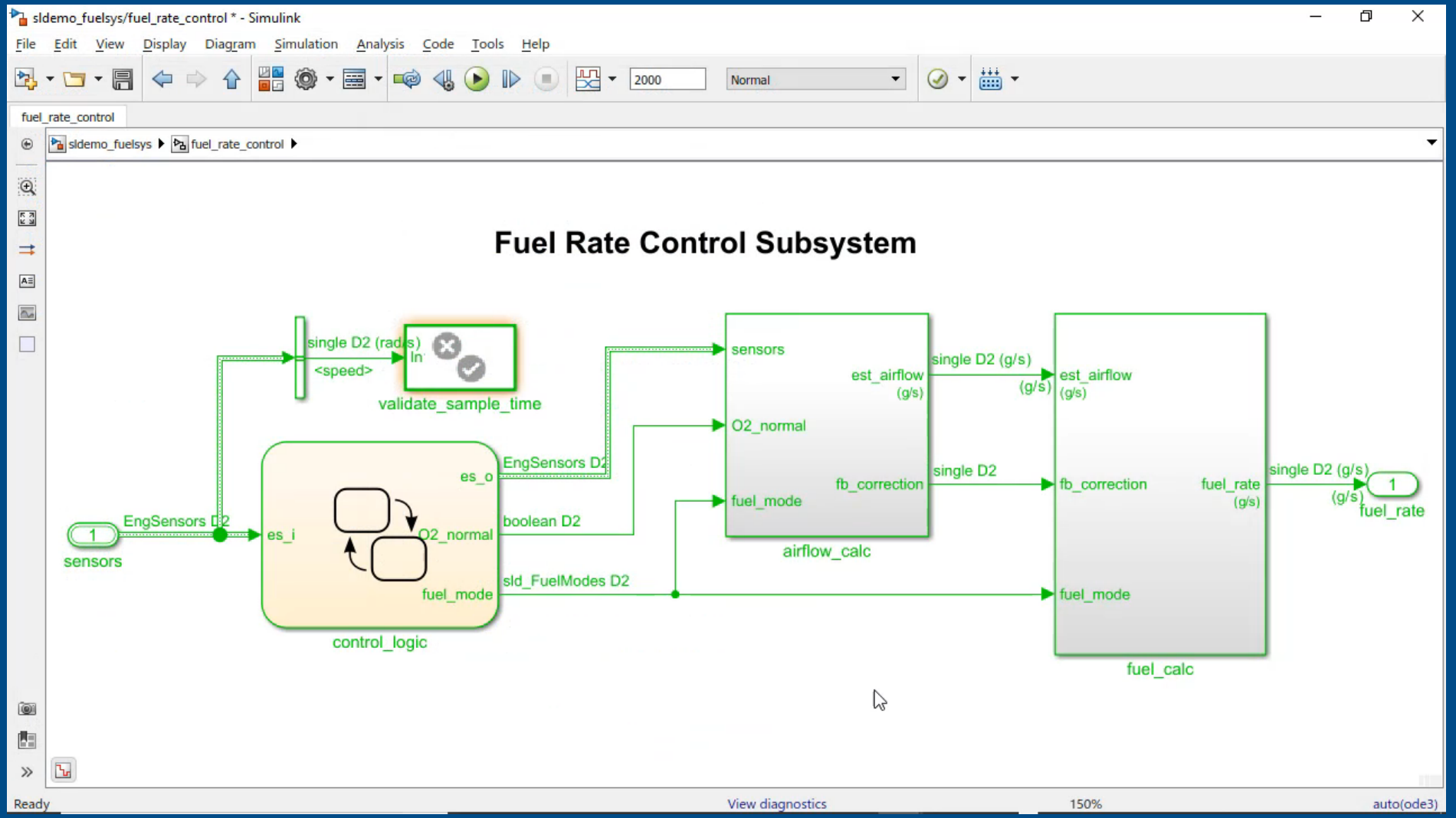
Viewing Generated Code Alongside the Model



Embedded Coder

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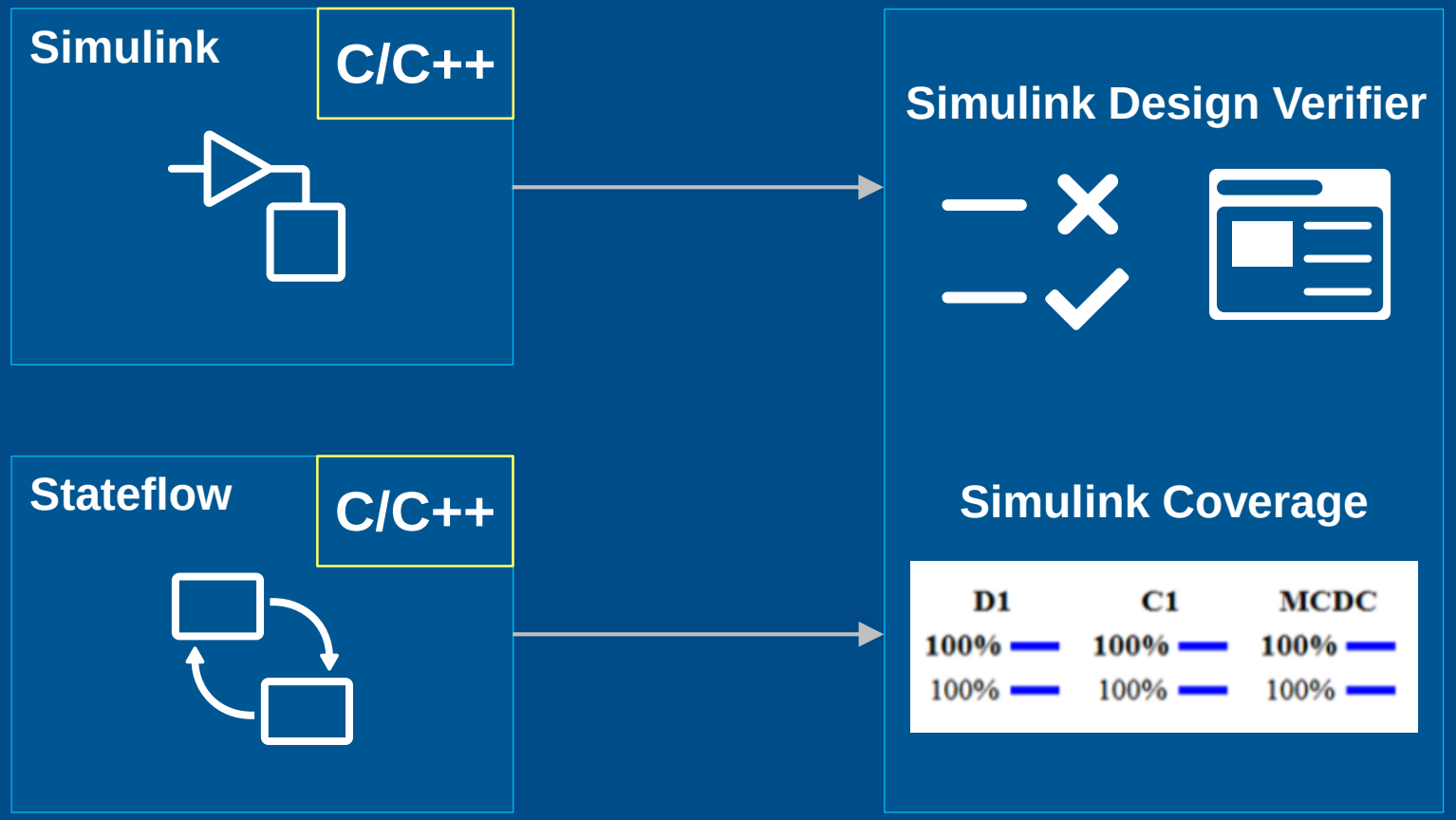
Include Custom Code in Test & Verification



Simulink Coverage

Simulink Design Verifier

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11:45	Deep Learning and Reinforcement Learning Workflows in AI *Jon Cherrie, MathWorks*	Controlling Complexity at McLaren Automotive Using the Latest MATLAB Features *Matthew Chave, McLaren Automotive Ltd*			
12:15	Extreme Quantum Mechanics in MATLAB *Ilya Kuprov, University of Southampton*	Systems Engineering: Requirements to Architecture to Simulation *Mark Walker, MathWorks*	Pixels to Features to Models: Object Detection and Image Segmentation *Matthew Elliott, MathWorks*	Deploying Deep Neural Networks to Embedded GPUs and CPUs *Steven Thomsett, MathWorks*	Developing a User Community to Drive Sharing, Self-Learning, and Personal Development *Matthew Offredi and Rayner Saggers, BAE Systems*
12:45	**Lunch**				
	Women in Tech Ignite Lunch *Janet Macmillan, MathWorks*				
	Networking and Exhibition Time				
14:00	Big Data, Big Transformation: Big Benefits for Large-Scale Engineering Products *Martin McDonald and Andrew Gorrie, Leonardo*	Simulating Passenger Comfort and Motion Sickness in Autonomous Vehicles *Michael Wheeldon, Ricardo*	Introduction to Simulink and Stateflow *Tim Johns, MathWorks*	Software Development Practices with MATLAB *David Sampson, MathWorks*	Developing a Battery Management System Using Simulink *Chris Lim, MathWorks*
14:30	Becoming a Data-Centric Engineering Team: Catching Up to the Data Deluge *Paul Peeling, MathWorks*	Automated Driving System Design and Simulation Using MATLAB and Simulink *GianCarlo Pacitti, MathWorks*			Accelerating Embedded Software Verification with Polyspace Static Code Analysis *Stefan David, MathWorks*
15:15	**Break**				
15:45	Developing Smart IoT Sensors Using the MathWorks Toolchain *Samuel Bailey, Skyrad Consulting*	Synchronous Machine Modelling Using Simscape *Peenki Rani, Cummins Generator Technologies*	Sensor Fusion and Tracking for Autonomous Systems *Marc Willerton, MathWorks*	Simplifying Requirements-Based Verification with Model-Based Design *Fraser Macmillen, MathWorks*	Predictive Maintenance with MATLAB *Phil Rottier, MathWorks*
16:15	Industrial IoT and Digital Twins *Coorous Mohtadi, MathWorks*	Developing Fit-For-Purpose Simscape Models to Support System and Control Design *Rick Hyde, MathWorks*			
17:00	**End of Day**				

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Read the Release Notes

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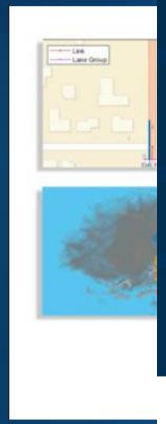
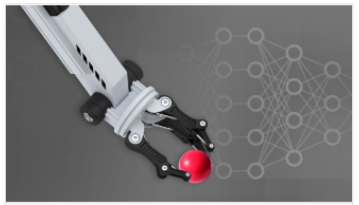


Release Highlights



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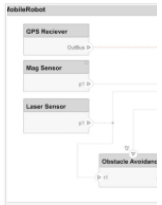

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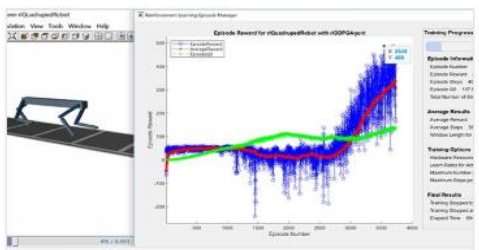

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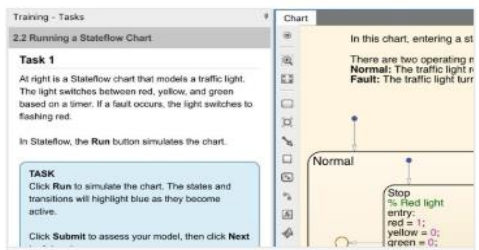

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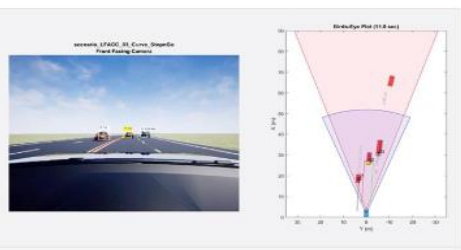

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Author AUTOSAR compositions and simulate with basic software services; test automated driving algorithms in 3D simulation; and leverage the deep learning engine model and P0-P4 HEV models for control algorithm testing and system simulation.

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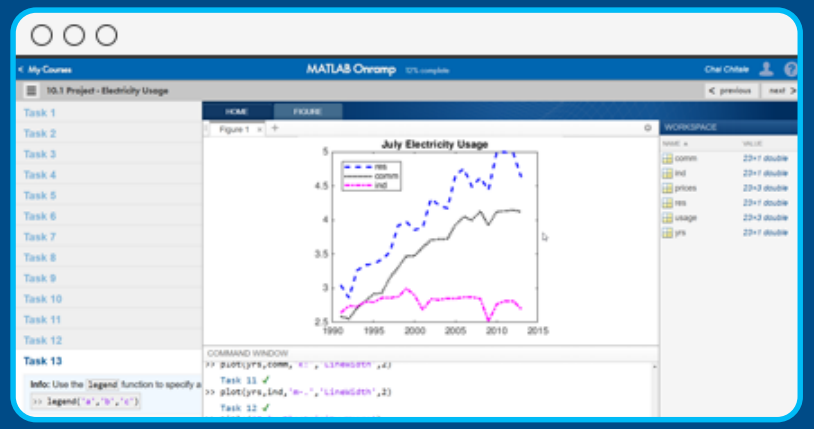
Get Started



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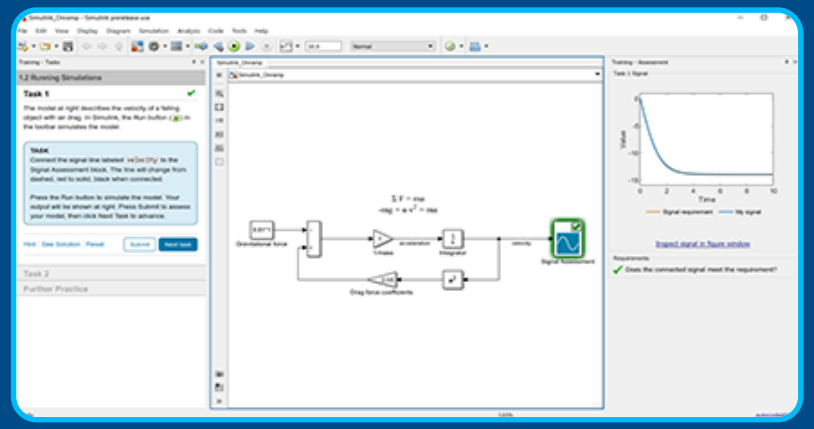
Quickly learn the essentials of MATLAB.



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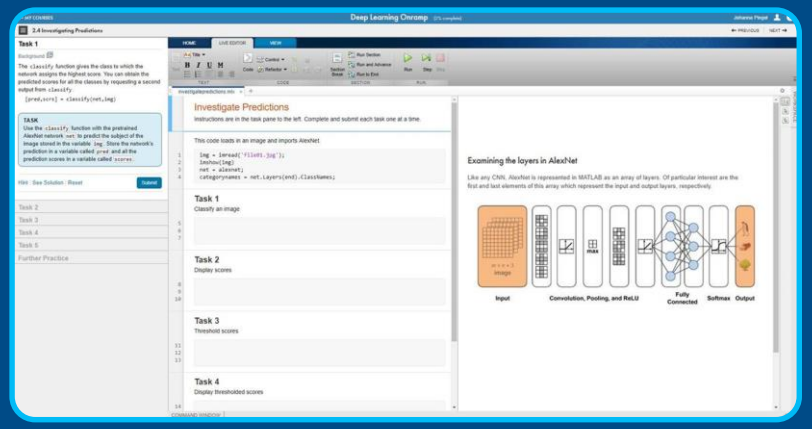

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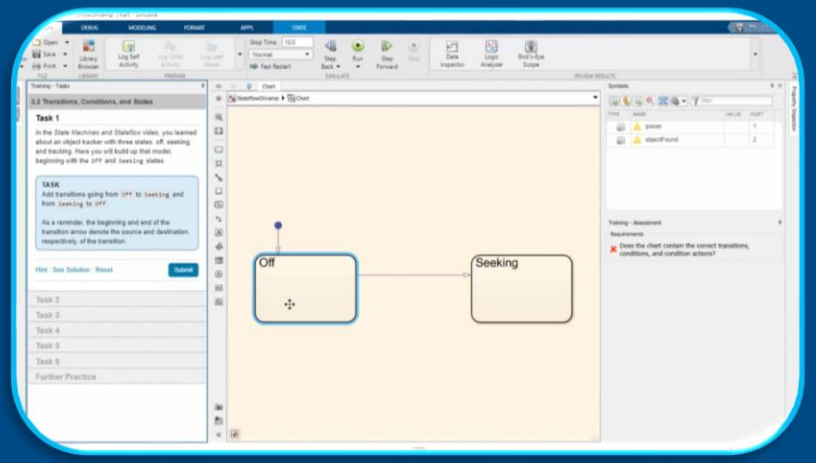
Learn to use deep learning techniques in MATLAB for image recognition.



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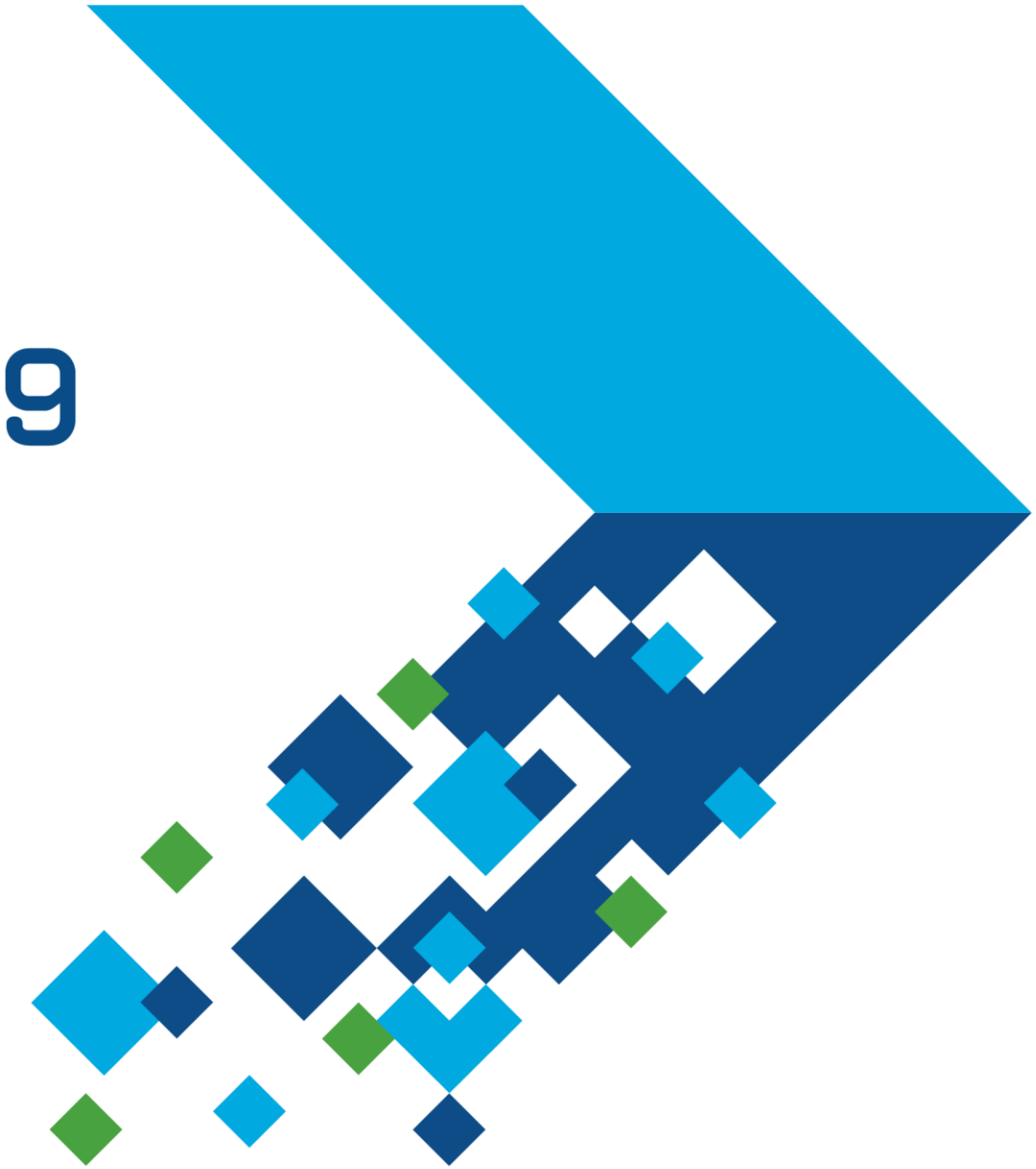
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