MATLAB EXPO 2018

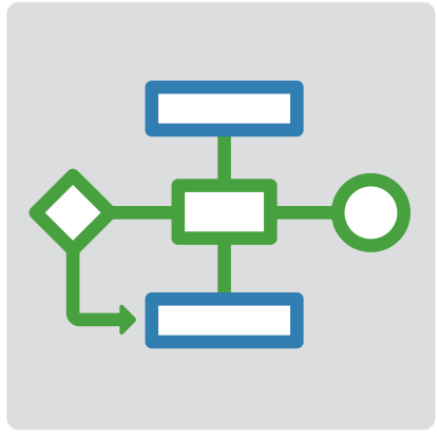
What's New in MATLAB and Simulink

Emelie Andersson, *Application Engineer*
Magnus Jung, *Application Engineer*

Platform Productivity

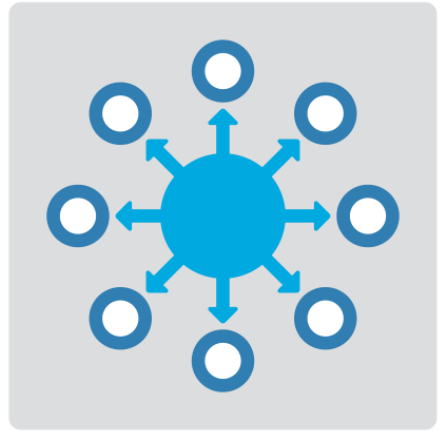
Getting your work done faster

Workflow Depth



Support for your entire workflow

Application Breadth



Products for the work you do

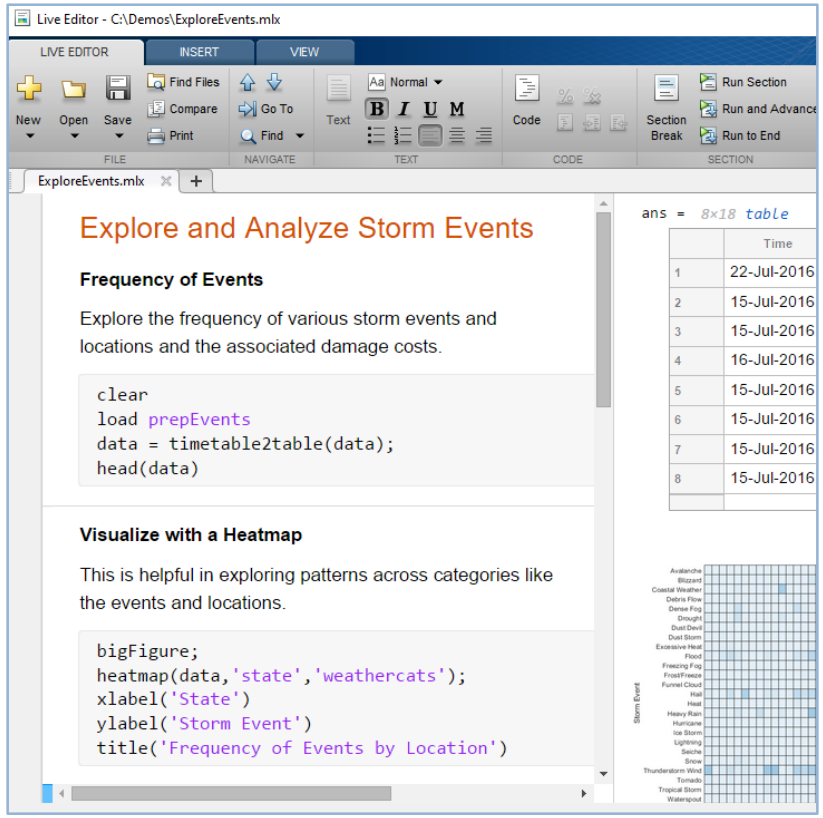
Platform Productivity

Workflow Depth

Application Breadth

- Create Your Designs Faster
- Simplify Analysis
- Execute Faster and Scale Your Work
- Collaborate

Create Your Designs Faster



MATLAB

Live Editor

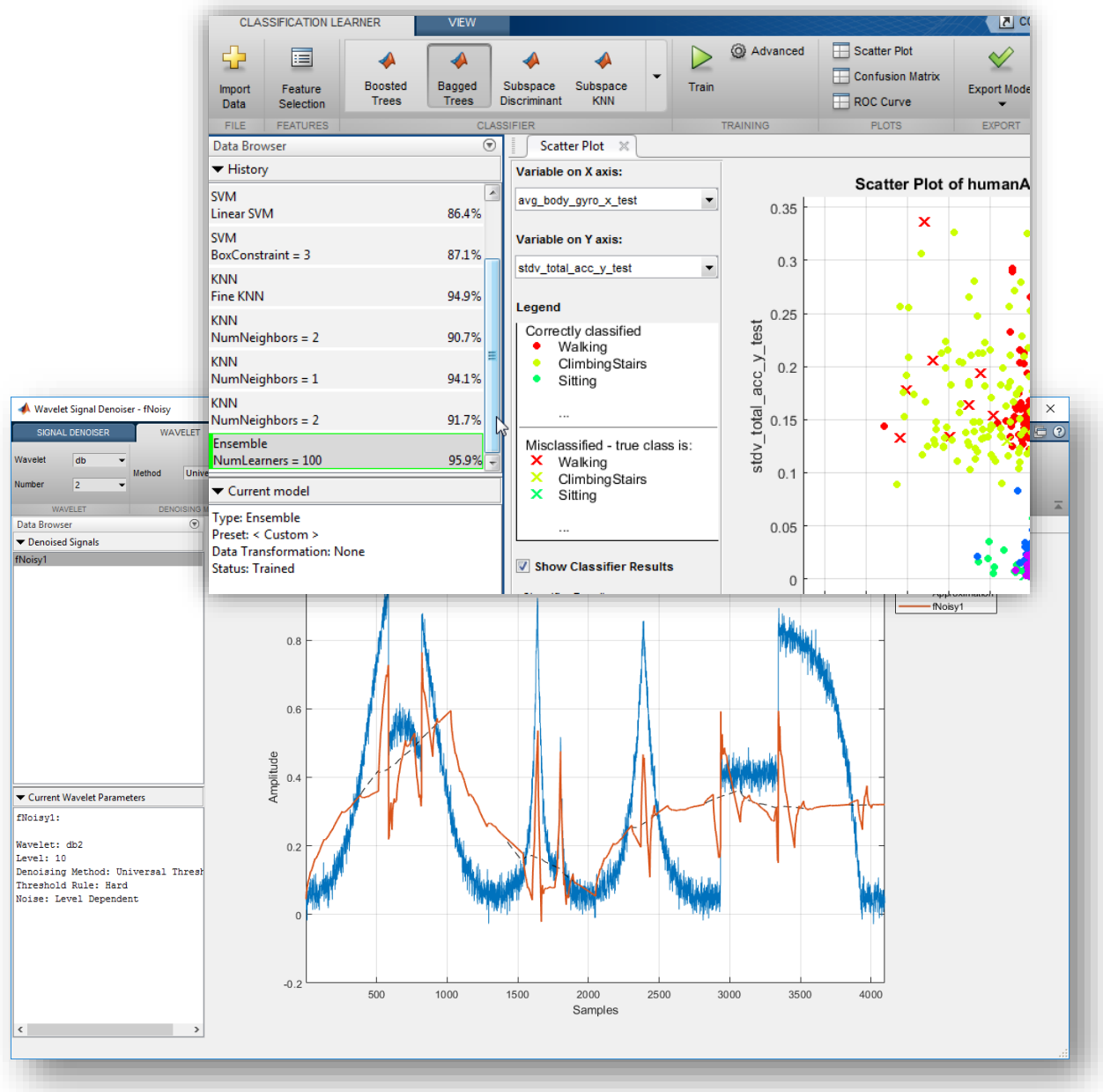
- Embedded results – avoid context switching
- Contextual hints - both for variables and available options for functions
- Interactive MATLAB code generation
- Tell a story – title, images, hyperlinks

Create Your Designs Faster

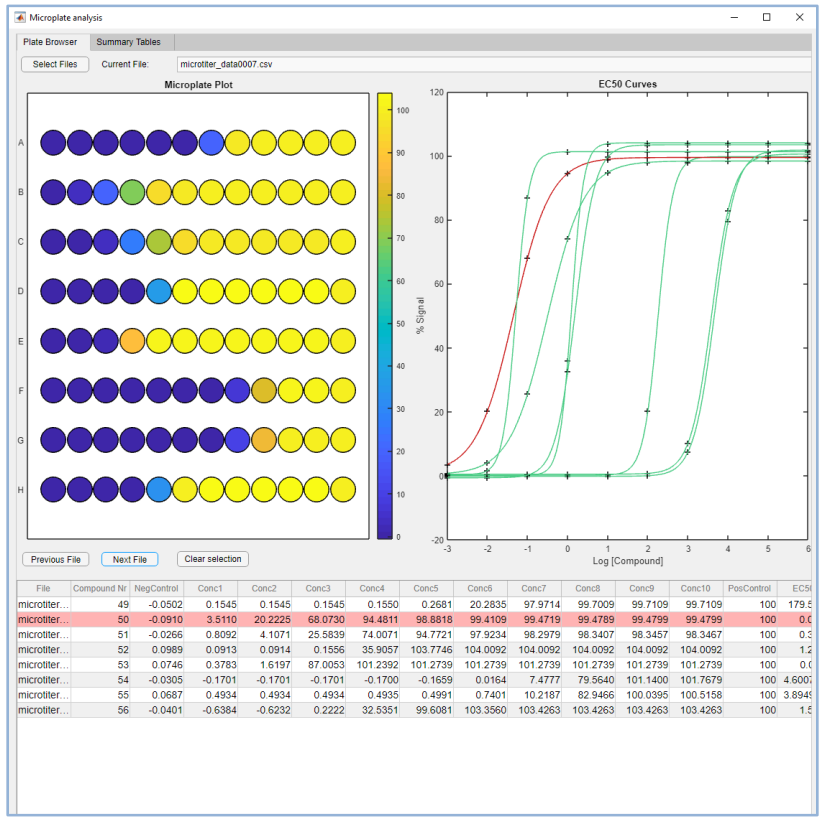
- Simplify Analysis with Apps

Interactive tools to speed up prototyping

- For signal data, machine learning, image labeling, and much more
- New Apps:
  - Econometric Modeler app
  - Analog Input Recorder app
  - Wavelet Signal Denoiser app

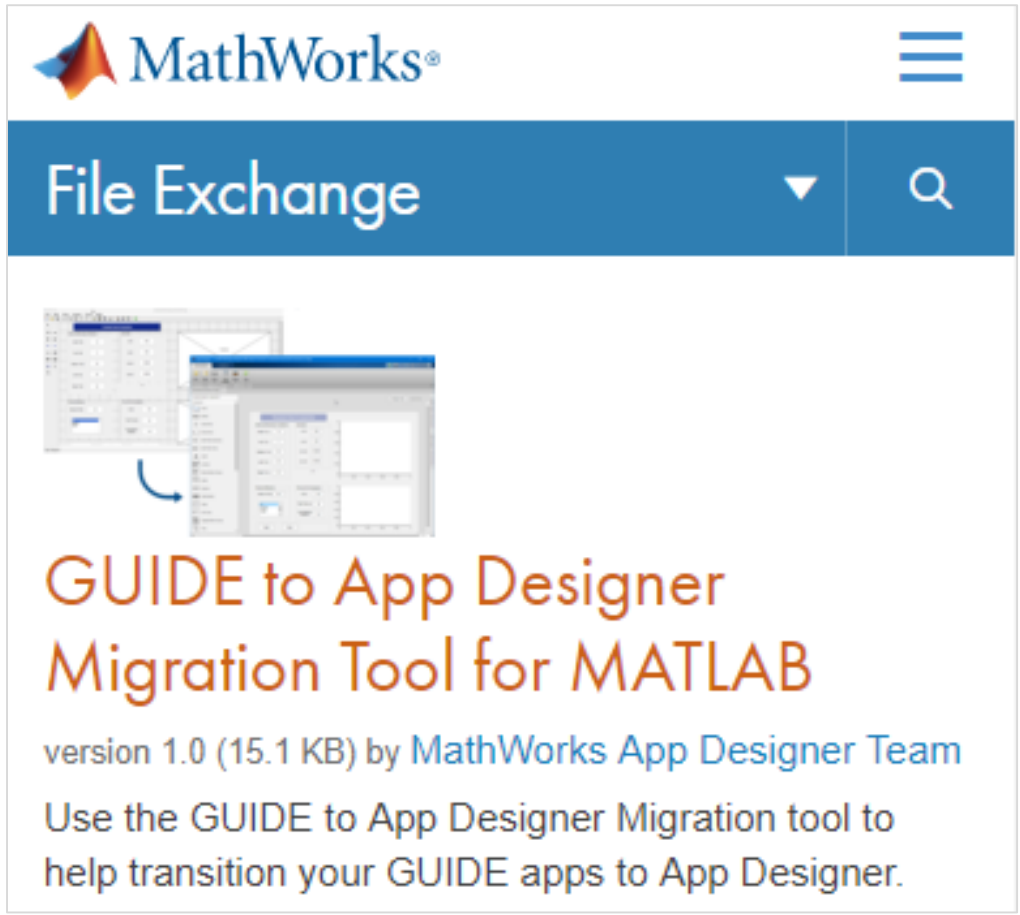


Create Your Designs Faster

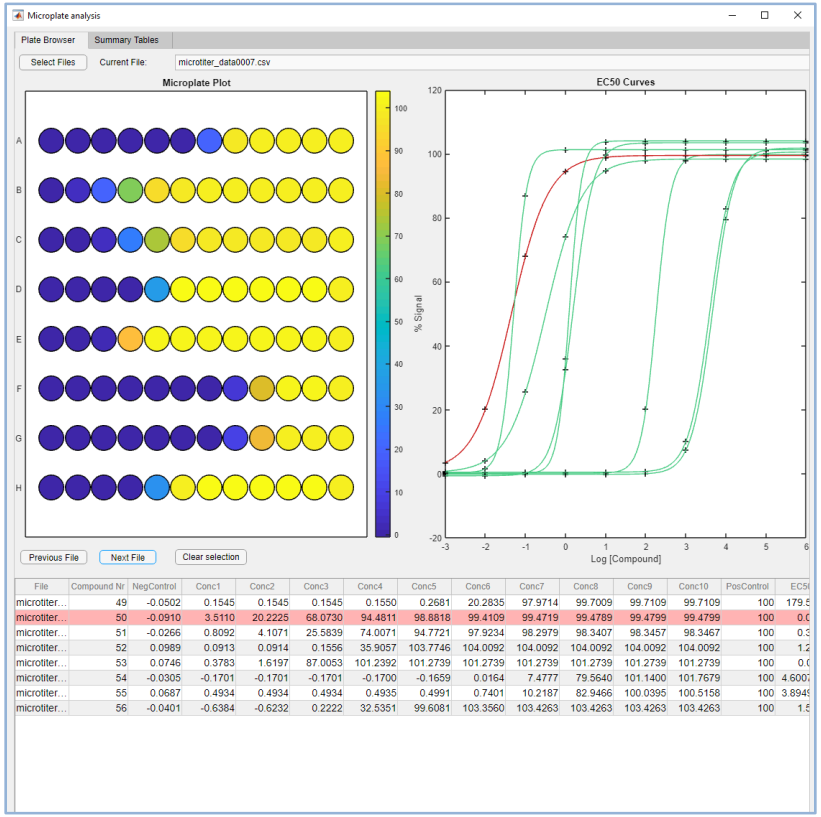


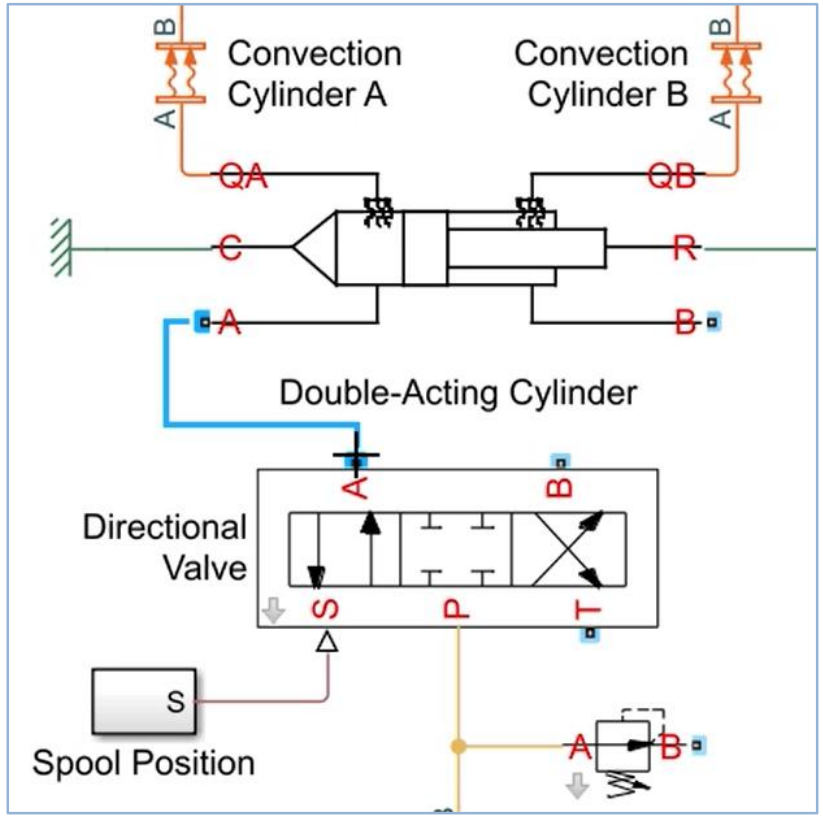
MATLAB

App Designer



Create Your Designs Faster

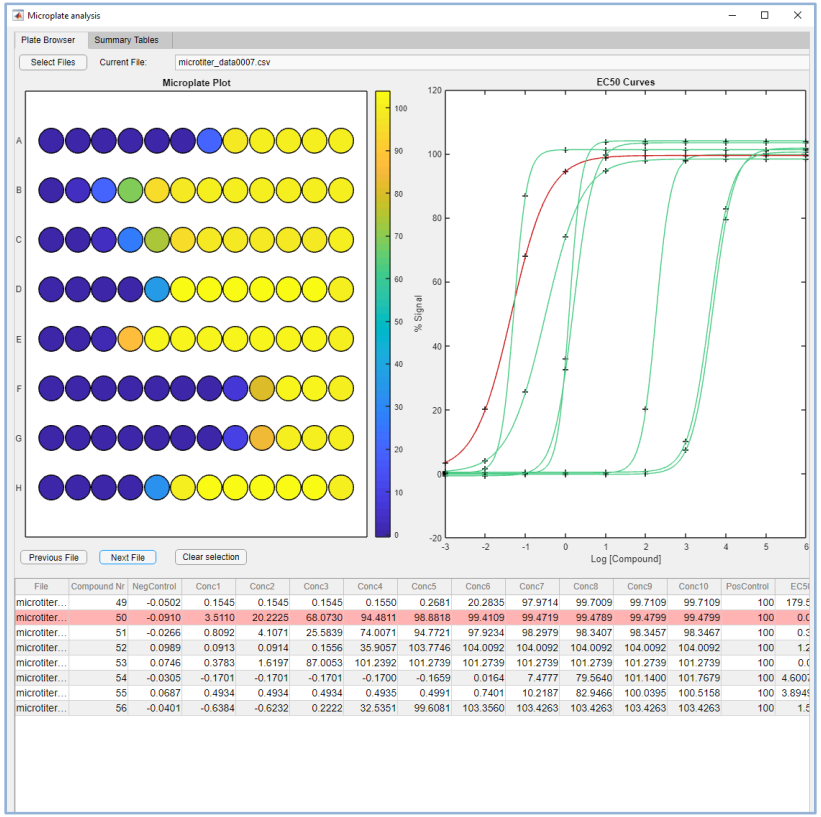


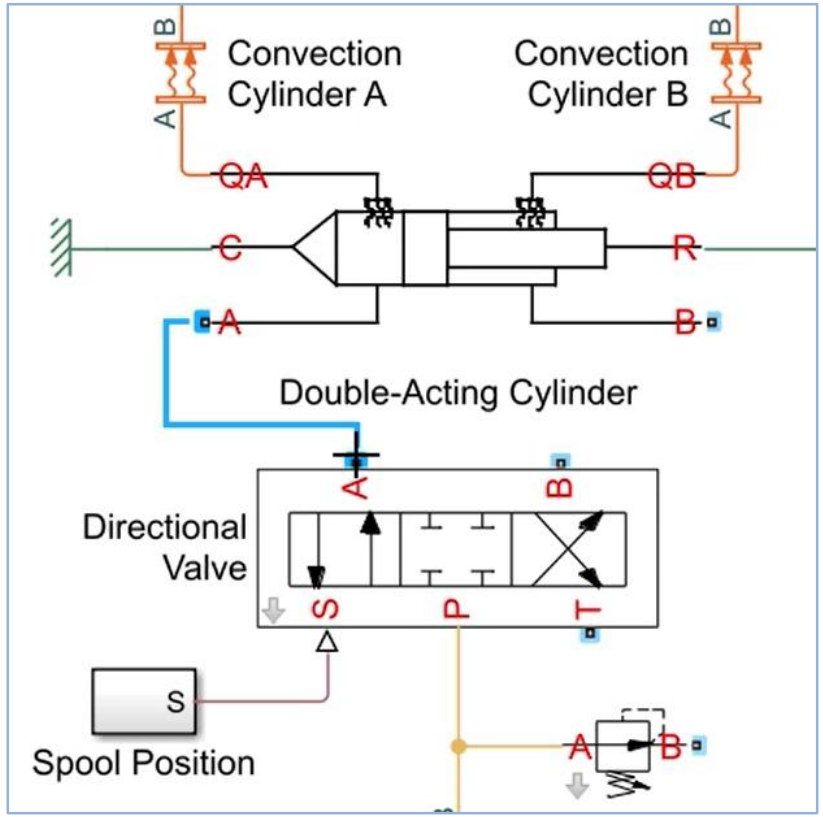


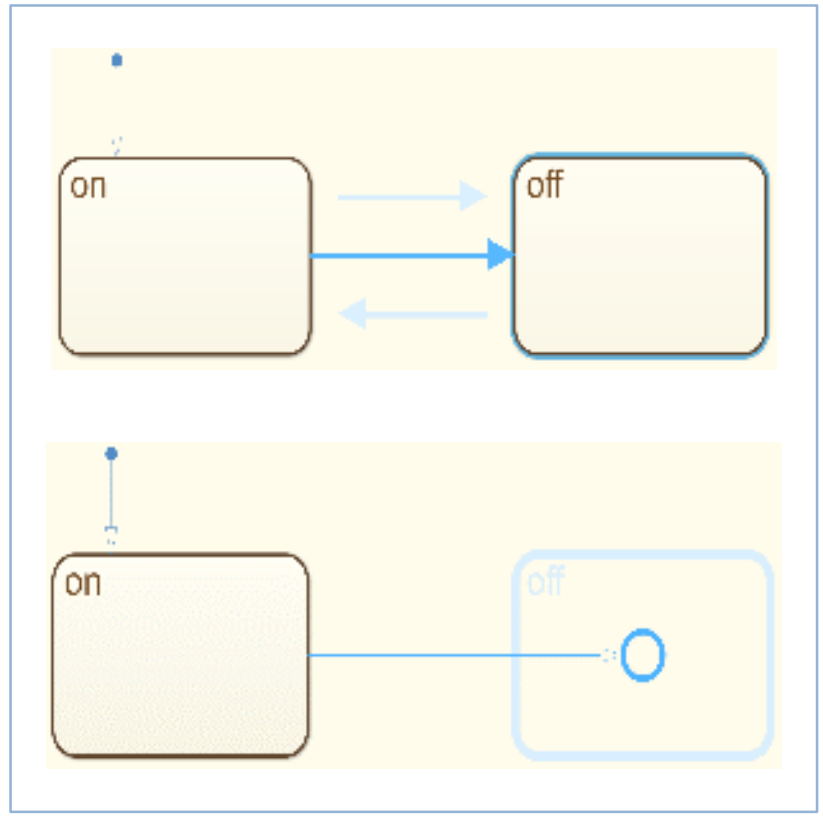
MATLAB

Simulink

Create Your Designs Faster





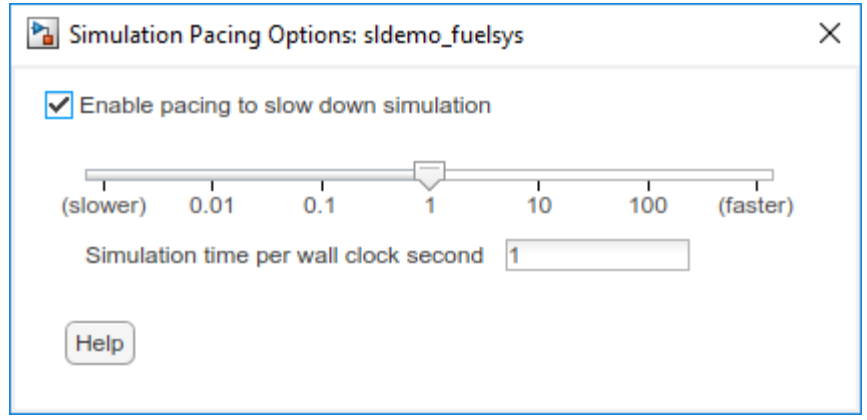


MATLAB **Simulink** **Stateflow**

Simplify Analysis by Simulating at Wall Clock Speed

Slow down the simulation for easier model interactivity

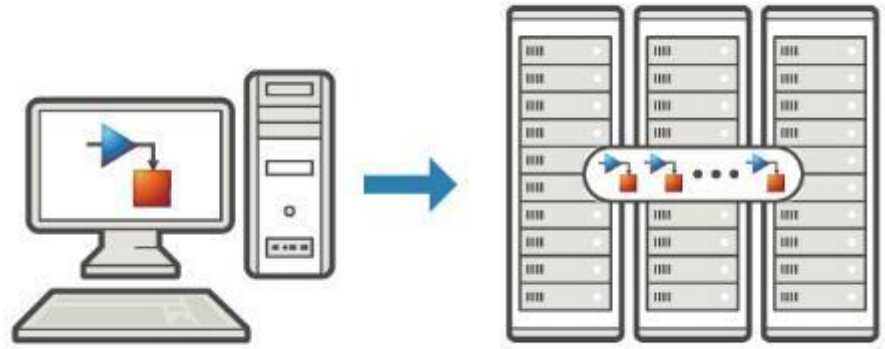
- Especially for models controlled and monitored via Dashboard blocks and other displays
- Useful when model is connected to hardware

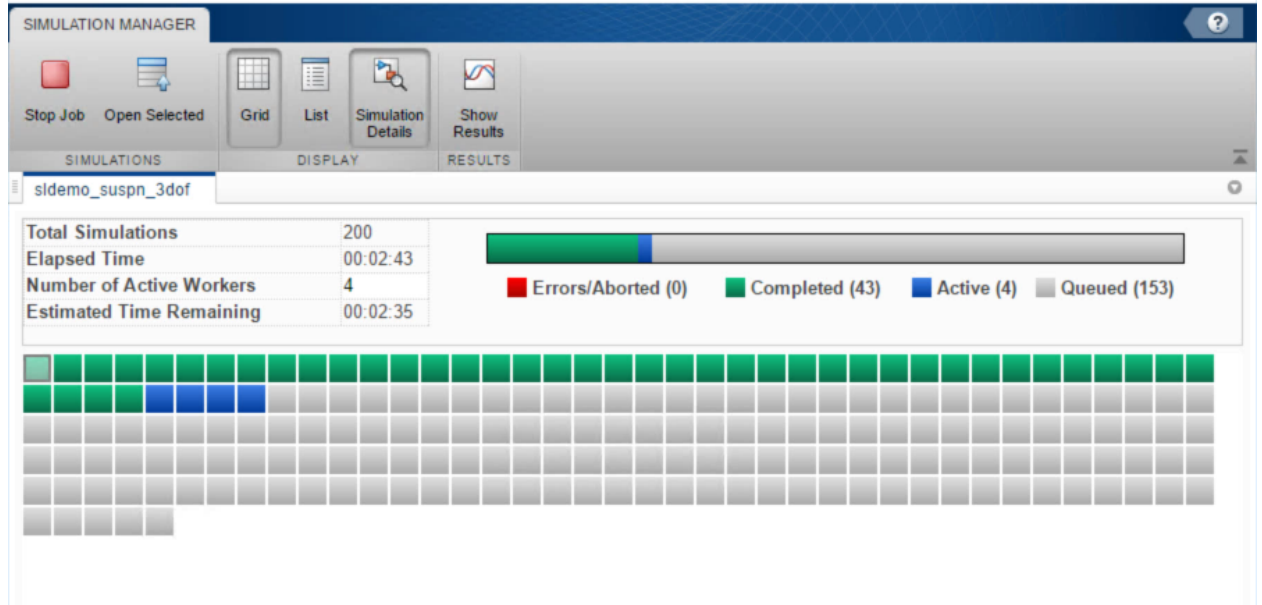


Scale Your Work

Use parallel computing to run multiple simulations faster

- Run multiple parallel simulations with `parsim`
- Monitor simulation status and progress in the Simulation Manager

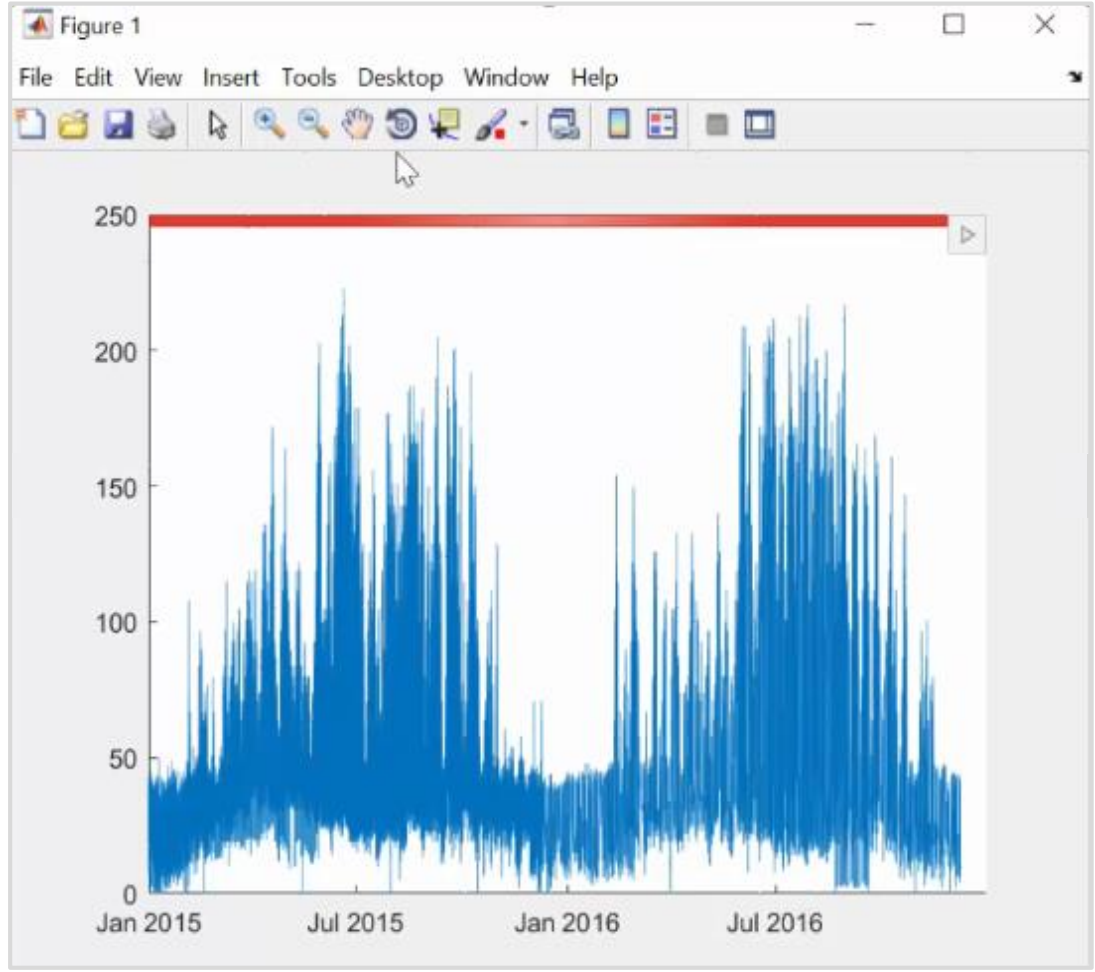




Scale Your Work

Use tall arrays to manipulate and analyze data that is too big to fit in memory

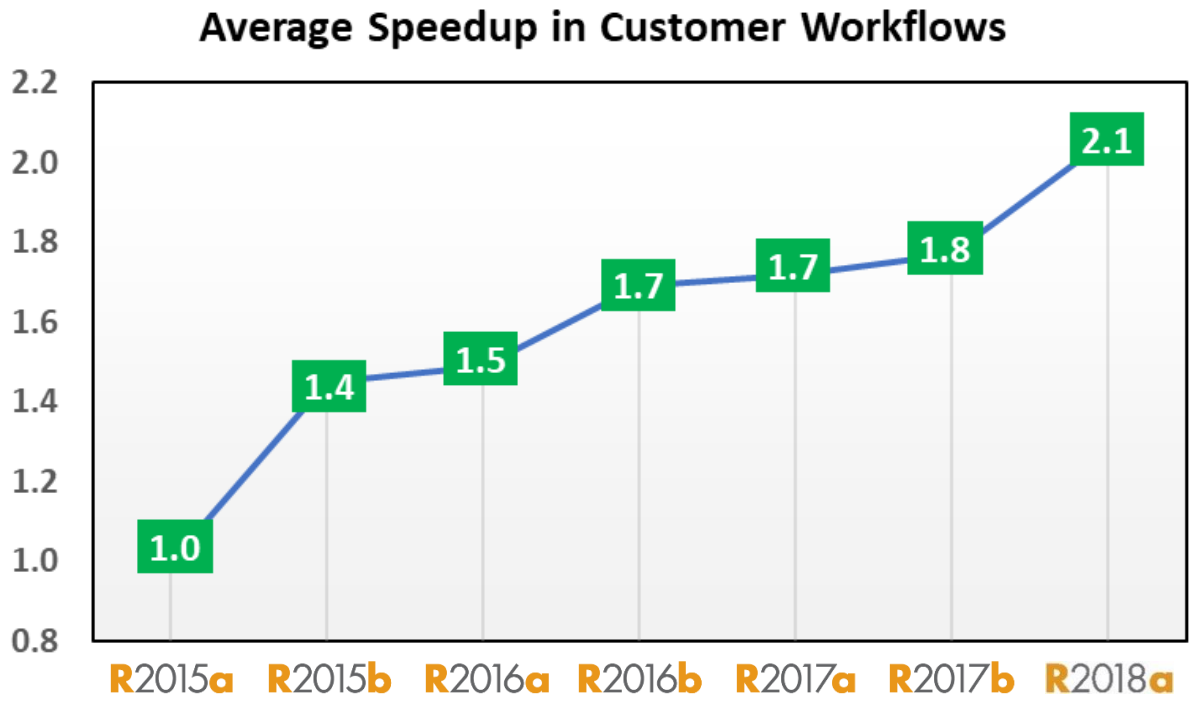
- Use familiar MATLAB functions and syntax
- Support for hundreds of functions
- Works with Spark + Hadoop clusters



Execute Faster

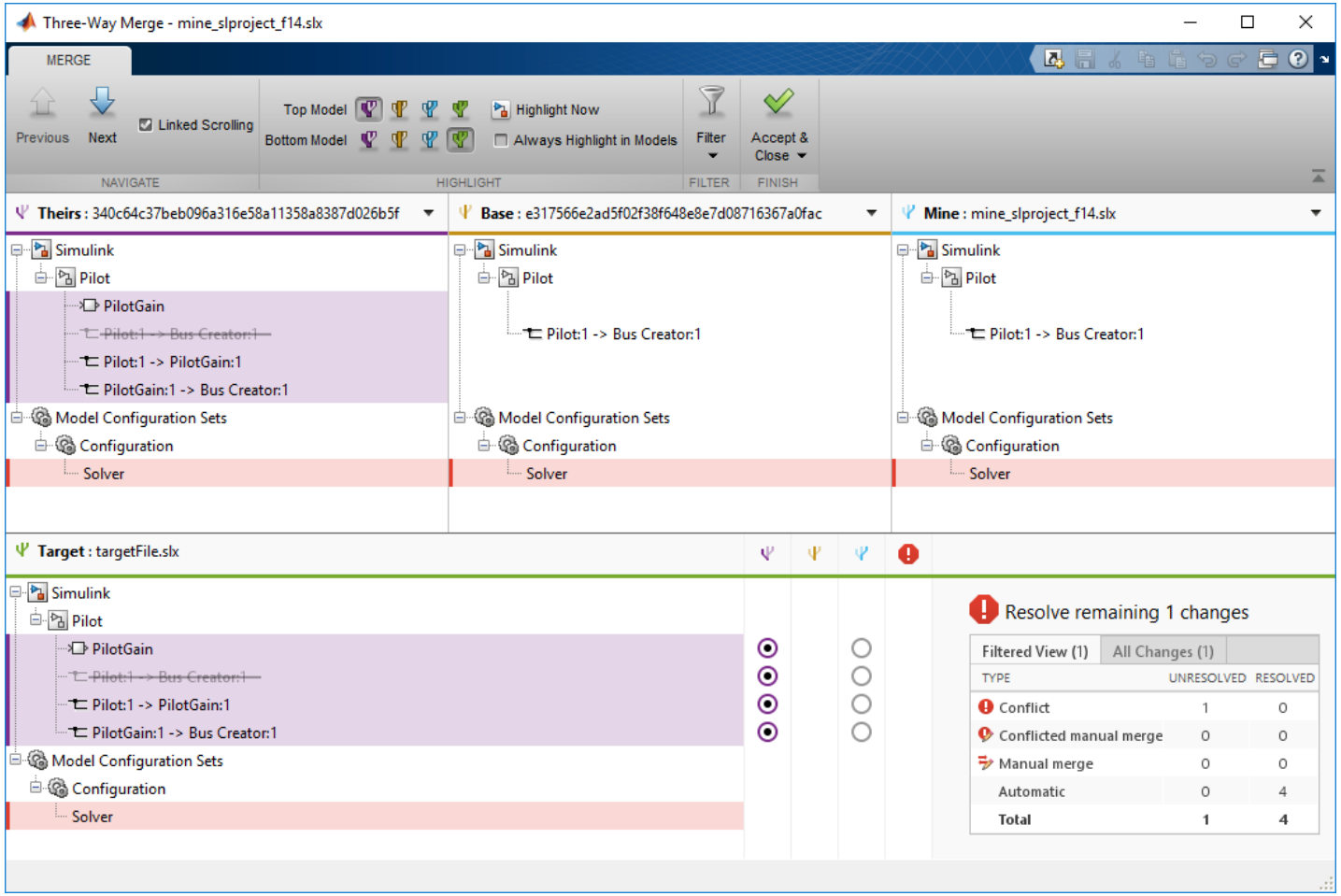
Redesigned execution engine runs MATLAB code faster

- All MATLAB code can now be JIT compiled
- MATLAB runs your code over twice as fast as it did just three years ago
- No need to change a single line of your code
- Increased speed of MATLAB startup in R2018a

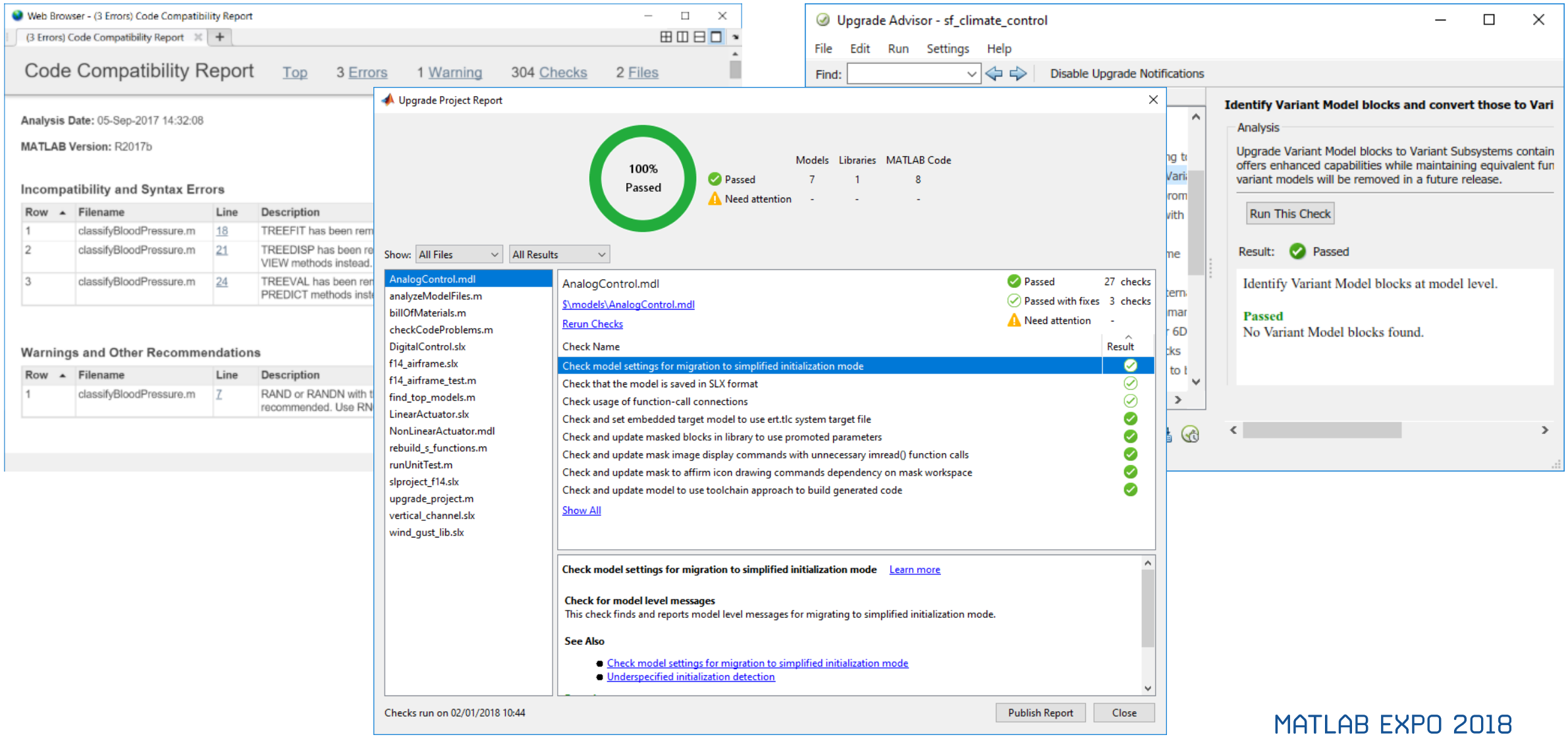


Team Collaboration

Diff and Merge to support team collaboration



Upgrade your MATLAB Code and Simulink Models



Platform Productivity

Workflow Depth

Application Breadth

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Platform Productivity

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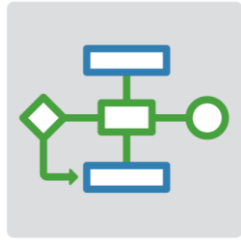
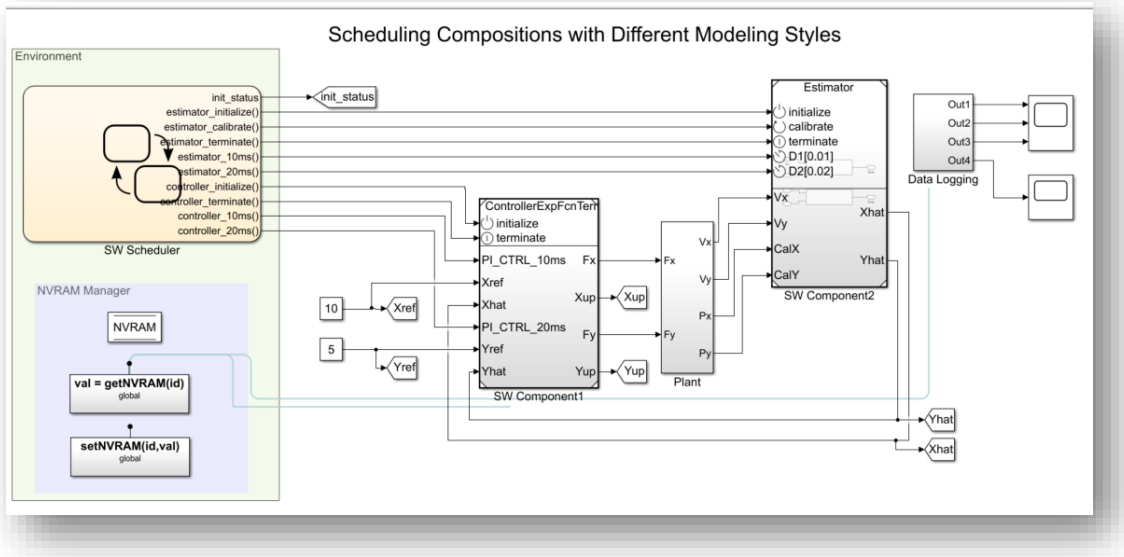


Application Breadth

- **Code Generation from Simulink Models**
- **Verification and Validation**

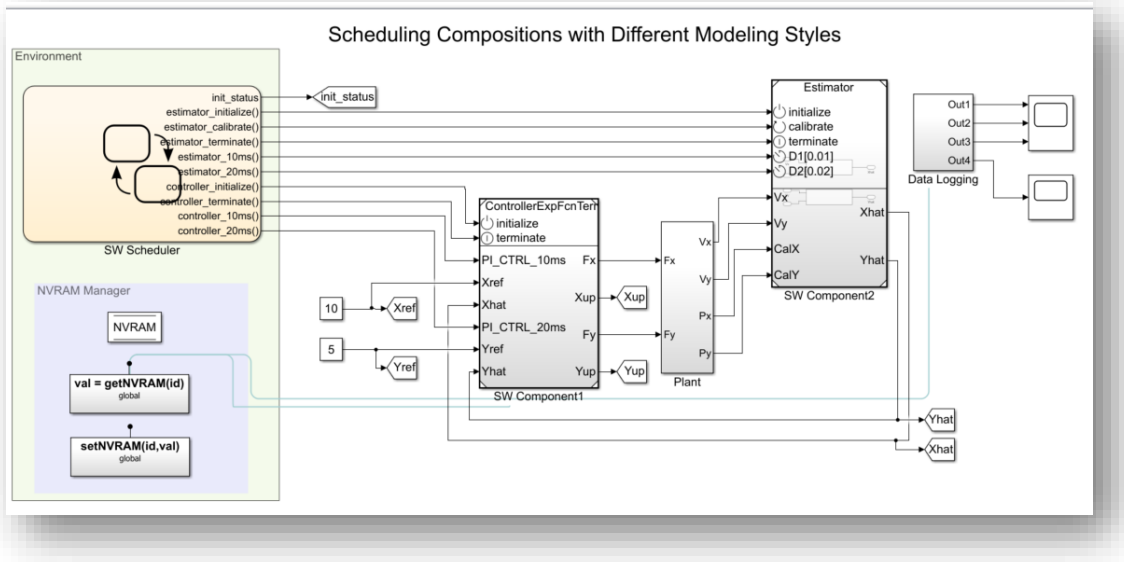
Prepare Your Model for Code Generation

Prepare model components for code generation

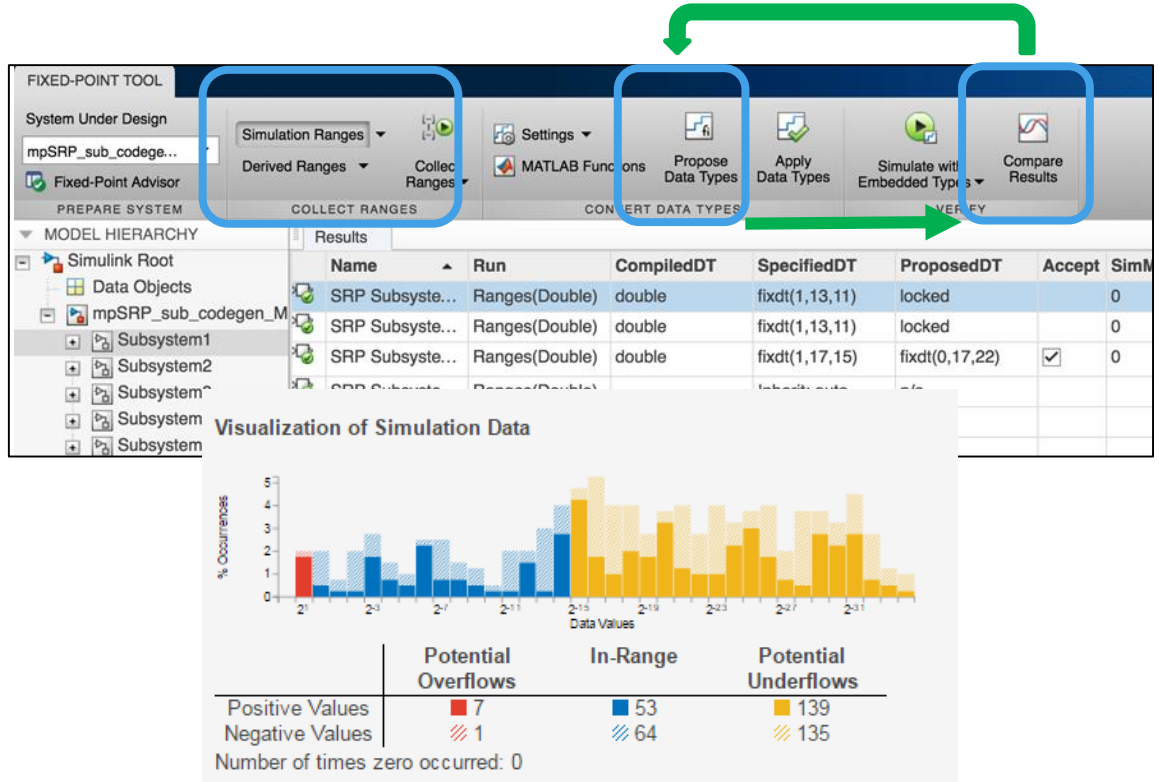


Prepare Your Model for Code Generation

Prepare model components for code generation



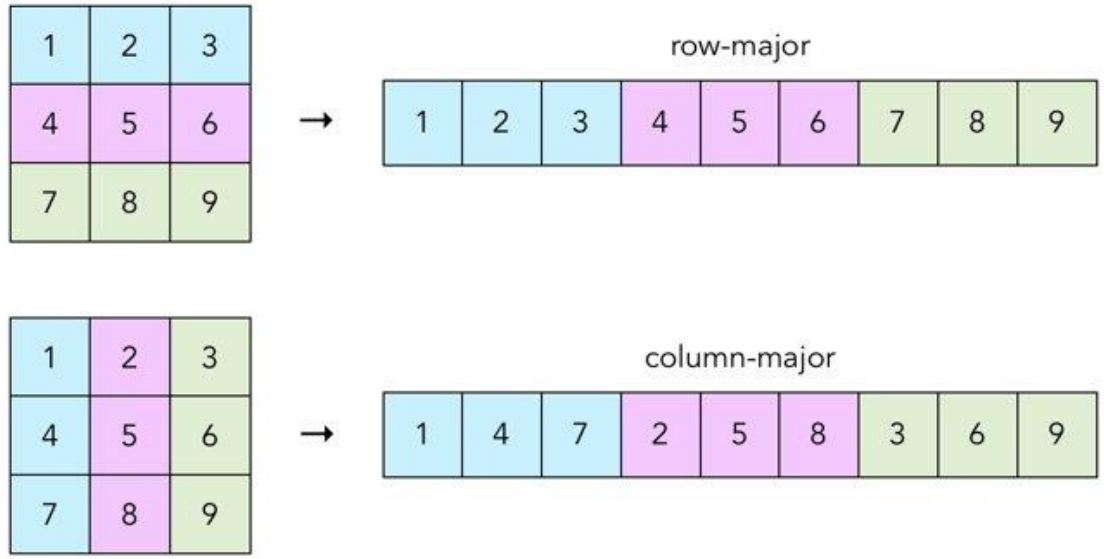
Prepare model data for code generation



Code Generation Workflow and Improvements

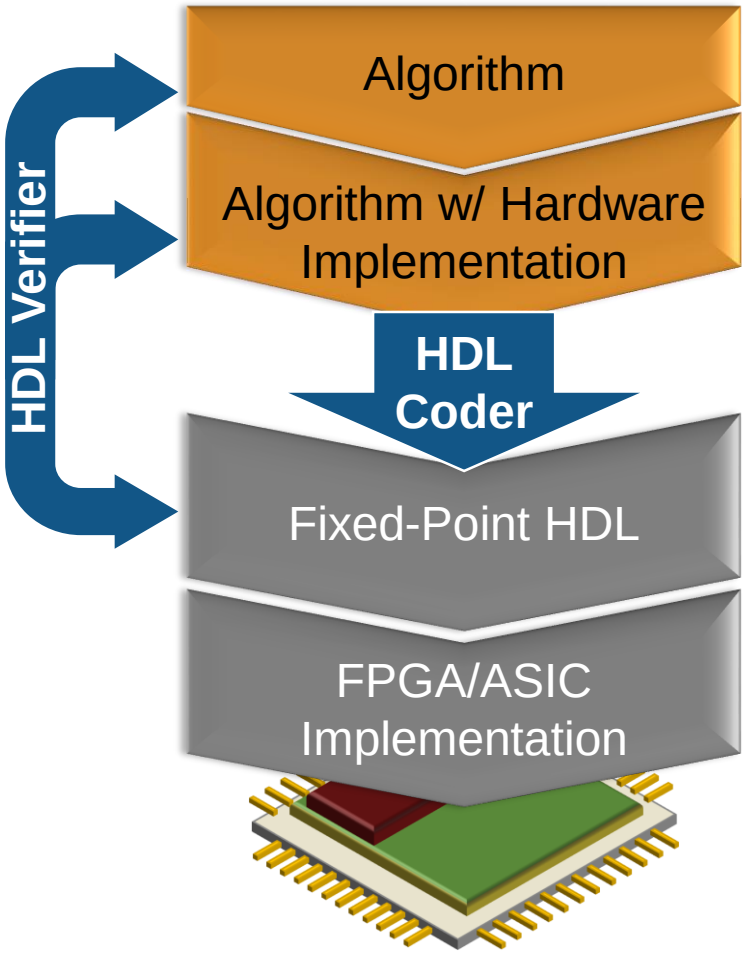
Access and define all the information in your model related to code generation

- View and define implementation data in one place
- View implementation details without model details
- Improve code performance and ease integration with other C code

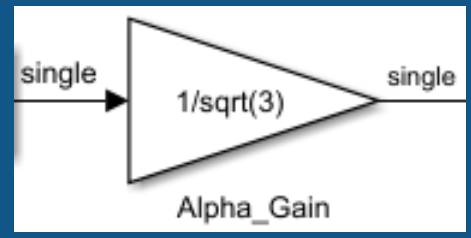


Row-major memory layout option

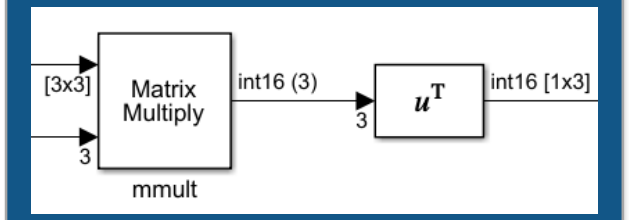
Deploying to FPGA or ASIC Hardware



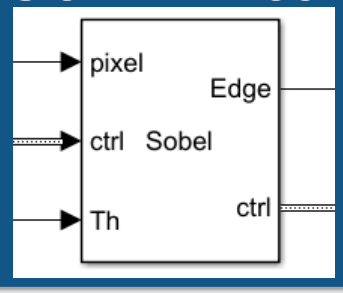
Native Floating Point



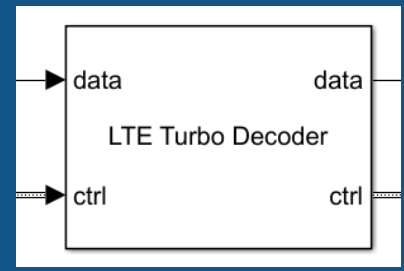
Matrix Support



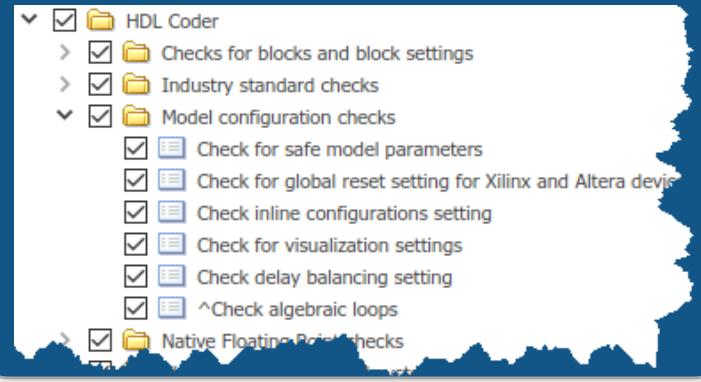
Vision HDL Toolbox



LTE HDL Toolbox

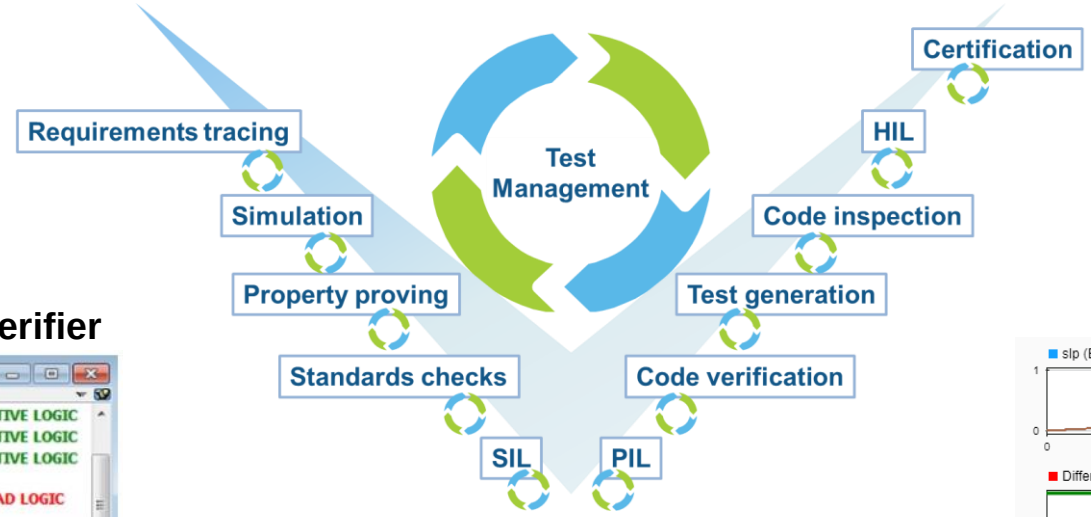


HDL Checks in Model Advisor



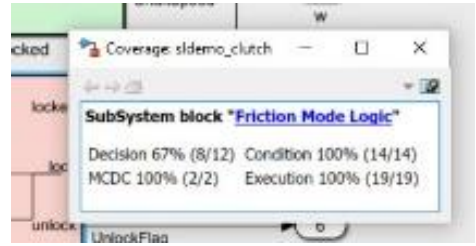
Verification and Validation

Products for the entire workflow

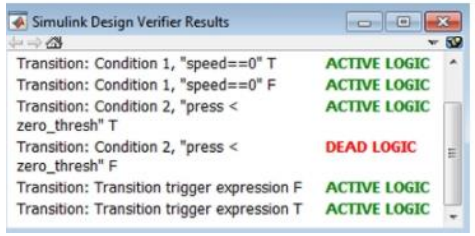


Simulink Requirements R2017b

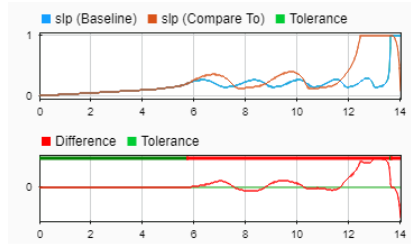
Simulink Coverage R2017b



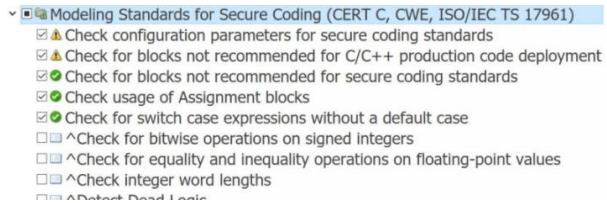
Simulink Design Verifier



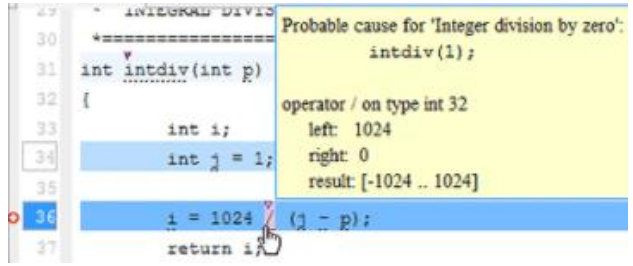
Simulink Test



Simulink Check R2017b



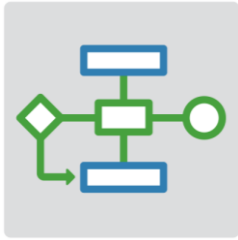
Polyspace



now supports AUTOSAR R2018a

Platform Productivity

Workflow Depth



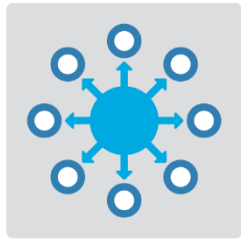
Application Breadth

- **Code Generation from Simulink Models**
- **Verification and Validation**

Platform Productivity

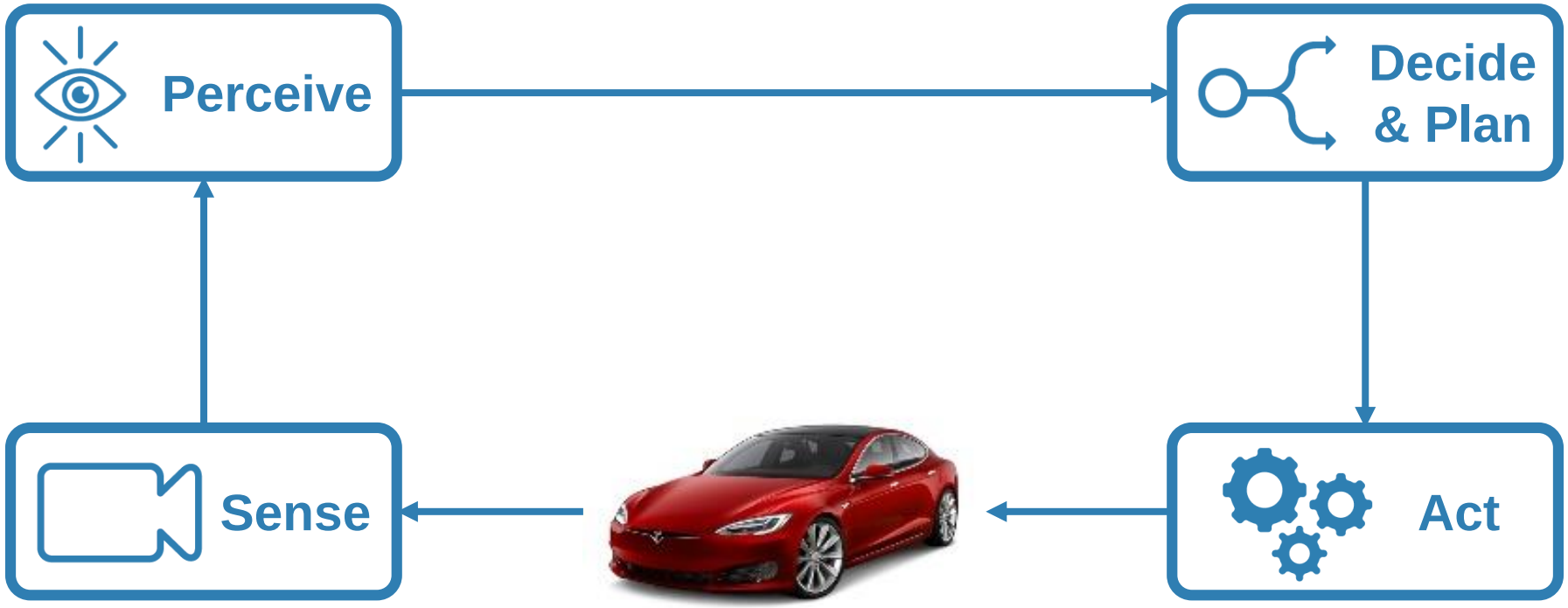
Workflow Depth

Application Breadth

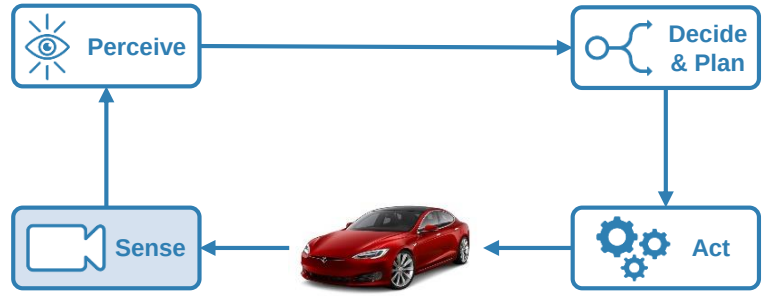


- Autonomous Systems
- Wireless Communications
- Artificial Intelligence (AI)

Designing Autonomous Systems

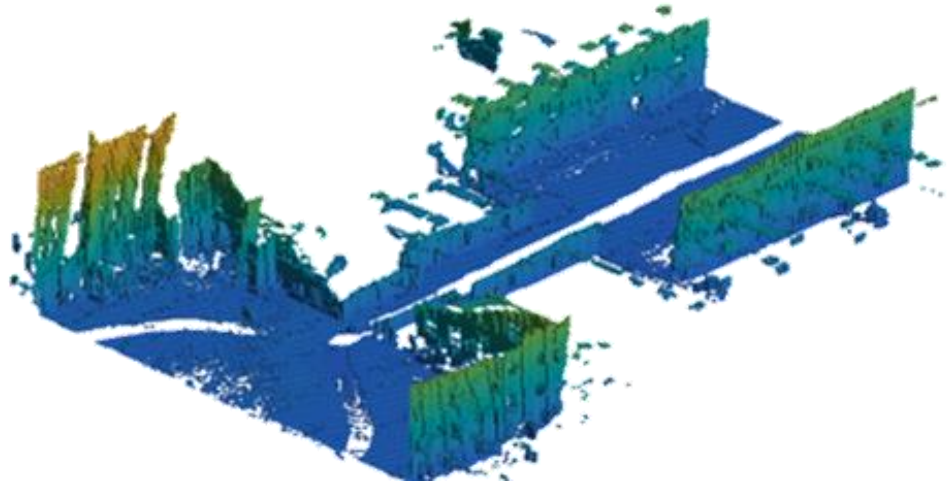


Designing Autonomous Systems

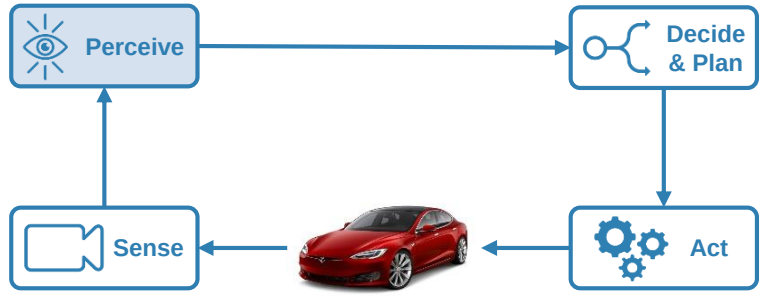


Mapping of environments using sensor data

- Segment and register lidar point clouds
- Lidar-Based SLAM: Localize robots and build map environments using lidar sensors



Designing Autonomous Systems

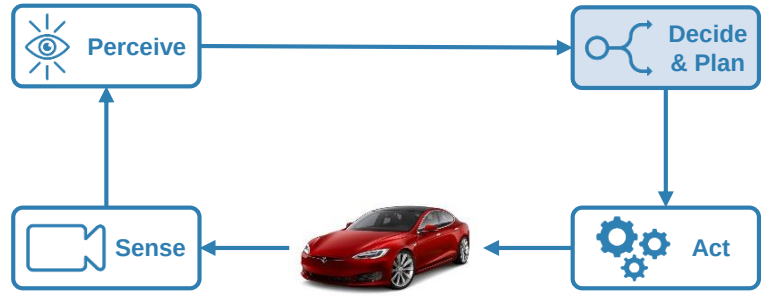


Understanding the environment using computer vision and deep learning techniques

- Object detection and tracking
- Semantic segmentation using deep learning

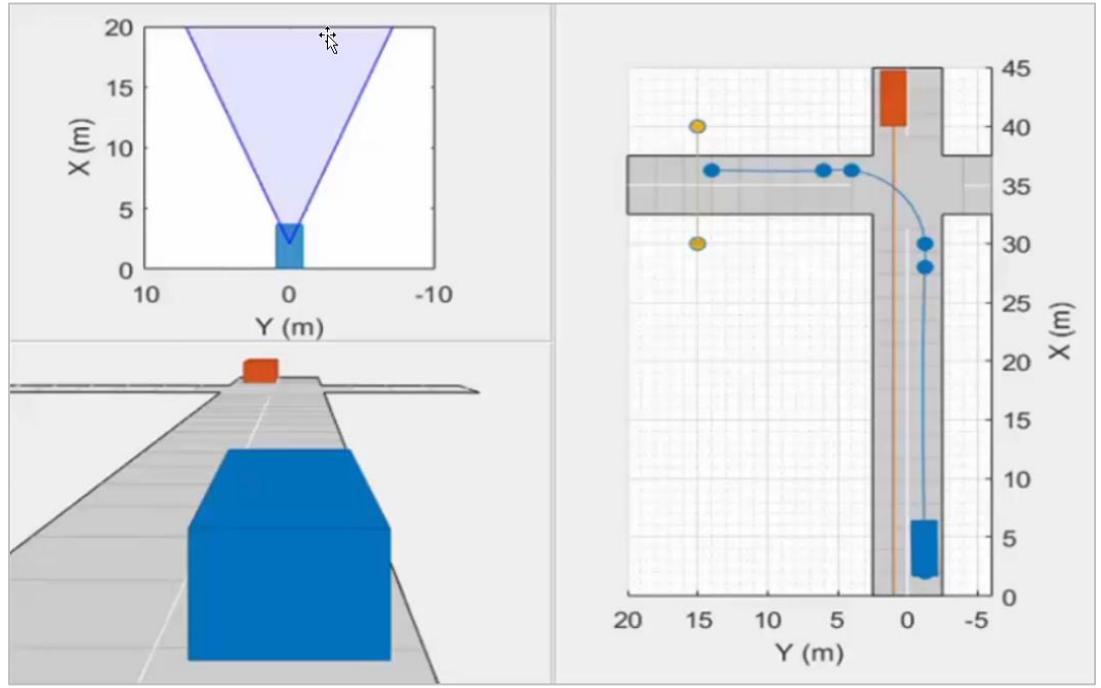
CamVid Database: Brostow, Gabriel J., Julien Fauqueur, and Roberto Cipolla. "Semantic object classes in video: A high-definition ground truth database." *Pattern Recognition Letters*Vol 30, Issue 2, 2009, pp 88-97.

Designing Autonomous Systems



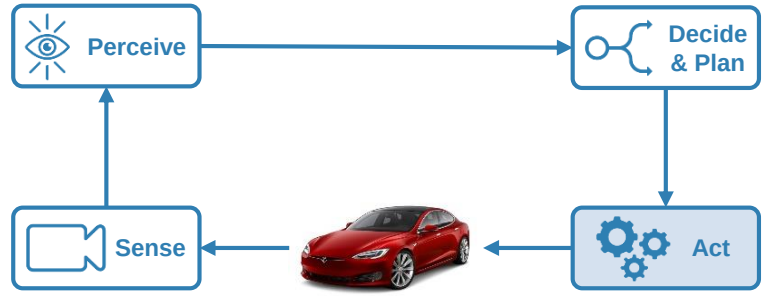
Design synthetic driving scenarios to test controllers and sensor fusion algorithms

- Interactively design synthetic driving scenarios composed of roads and actors *(vehicles, pedestrians, etc.)*
- Generate visual and radar detections of actors



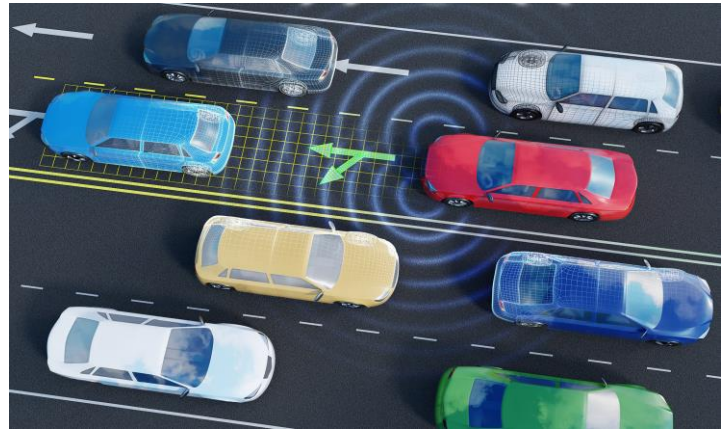
Driving Scenario Designer App

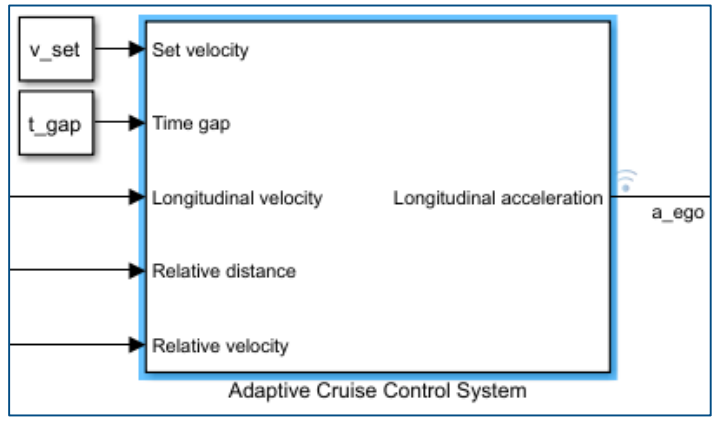
Designing Autonomous Systems

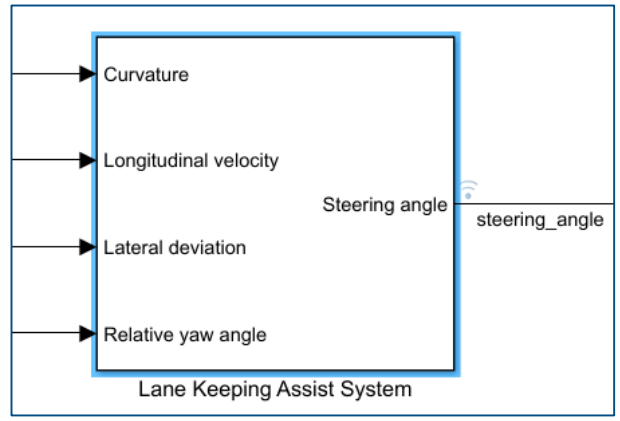


Model predictive control for adaptive cruise control and lane-keeping algorithms

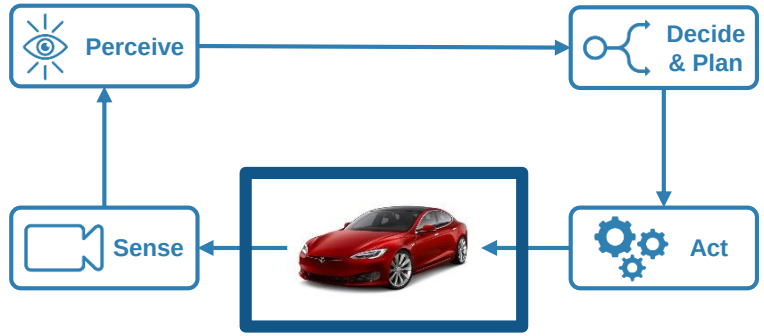
- Use prebuilt blocks instead of starting from scratch
- Simplified application-specific interfaces for configuring model predictive controllers
- Flexibility to customize for your application







Full Vehicle Simulation



Ride & handling

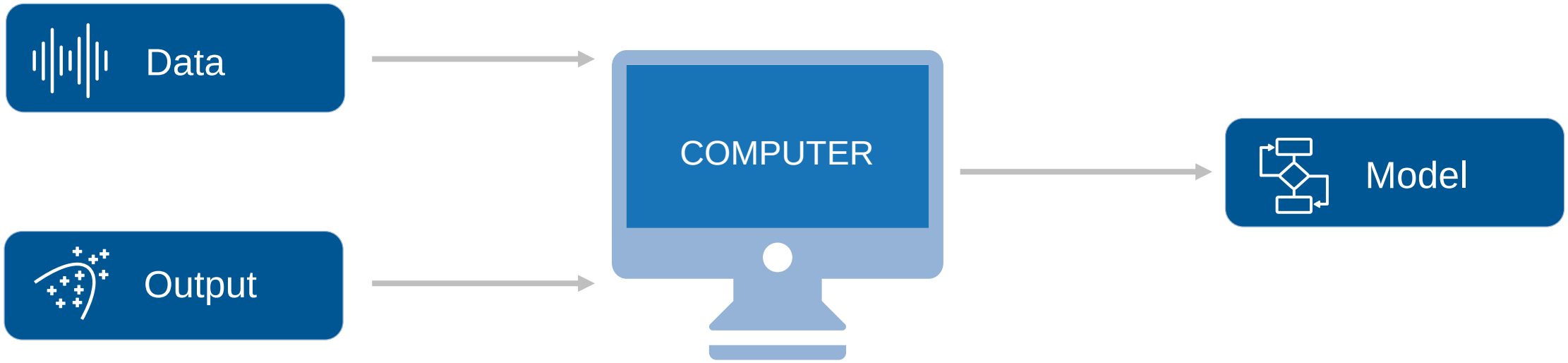
Chassis controls

Automated Driving

Design with the Latest Wireless Standards

NB-IoT

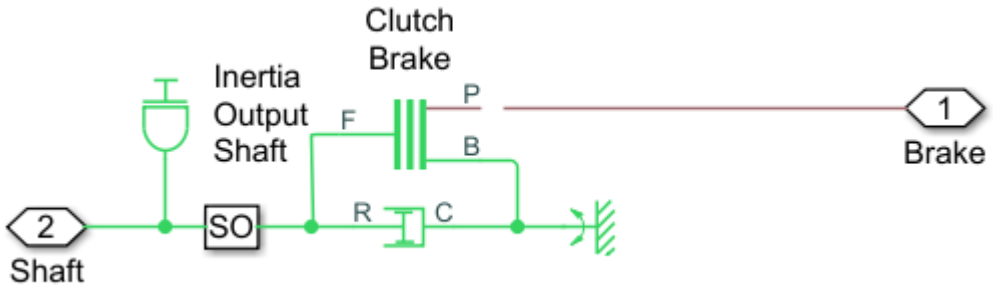
Artificial Intelligence



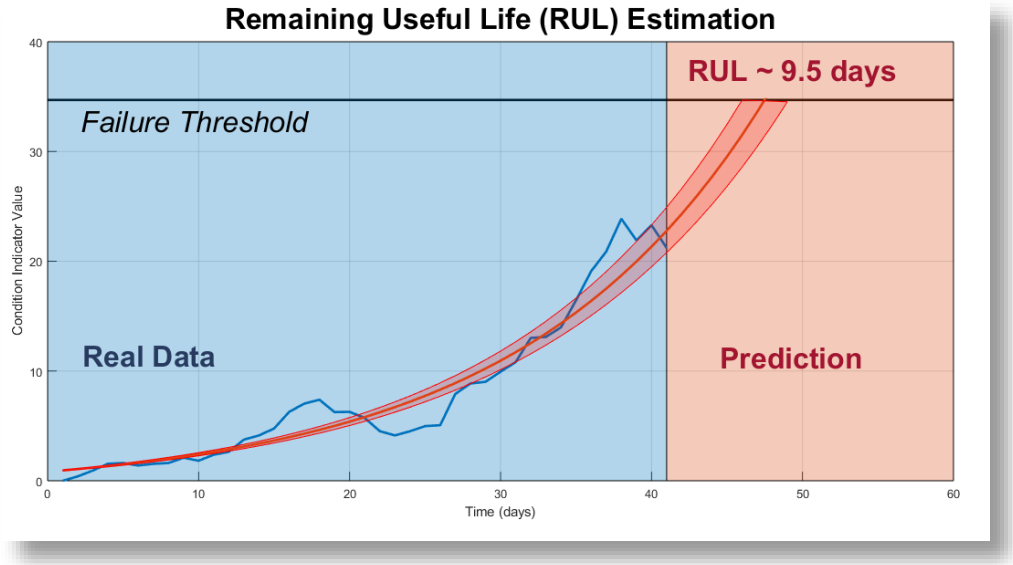
Predictive Maintenance

Data

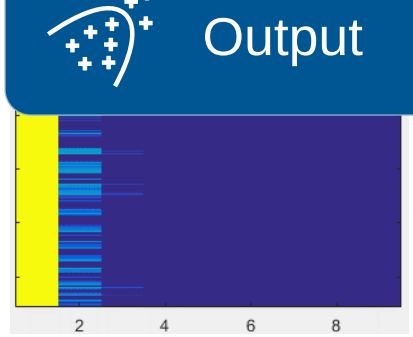
Sensors



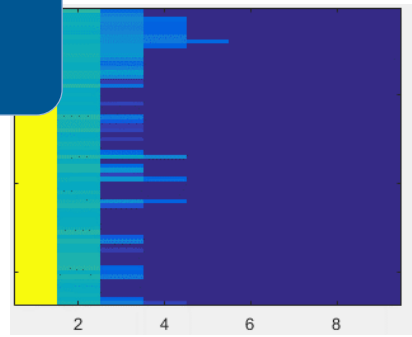
Model



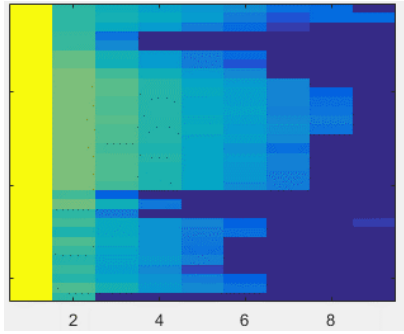
Output



Normal Operation



Monitor Closely

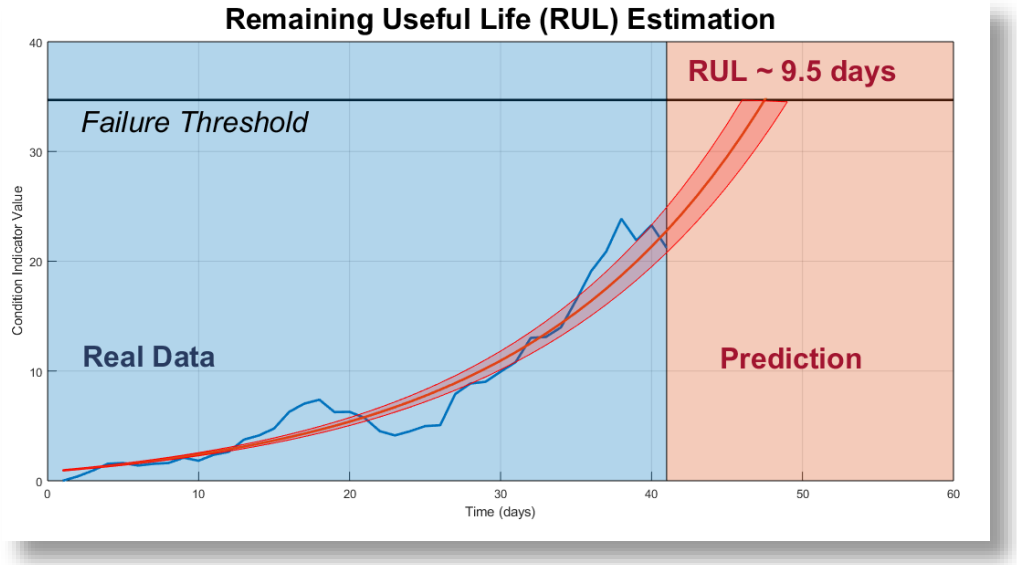


Maintenance Needed

Predictive Maintenance

Design and test condition monitoring and predictive maintenance algorithms

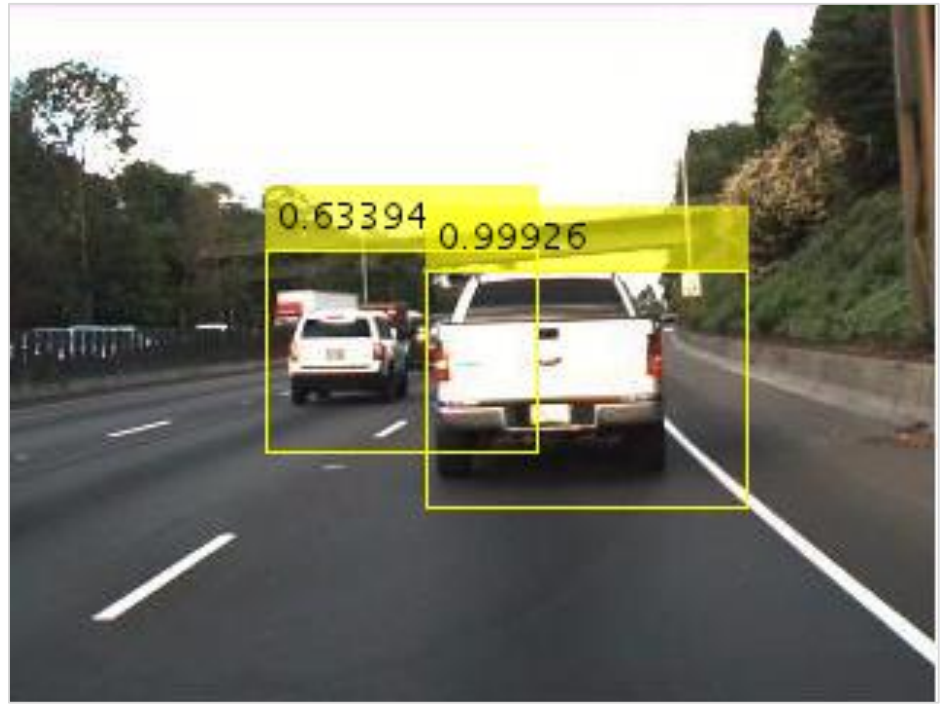
- Import sensor data from local files and cloud storage
  (Amazon S3, Windows Azure Blob Storage, and Hadoop HDFS)
- Use simulated failure data from Simulink models
- Get started with examples
  (motors, gearboxes, batteries, and other machines)



Deep Learning

Data

Model

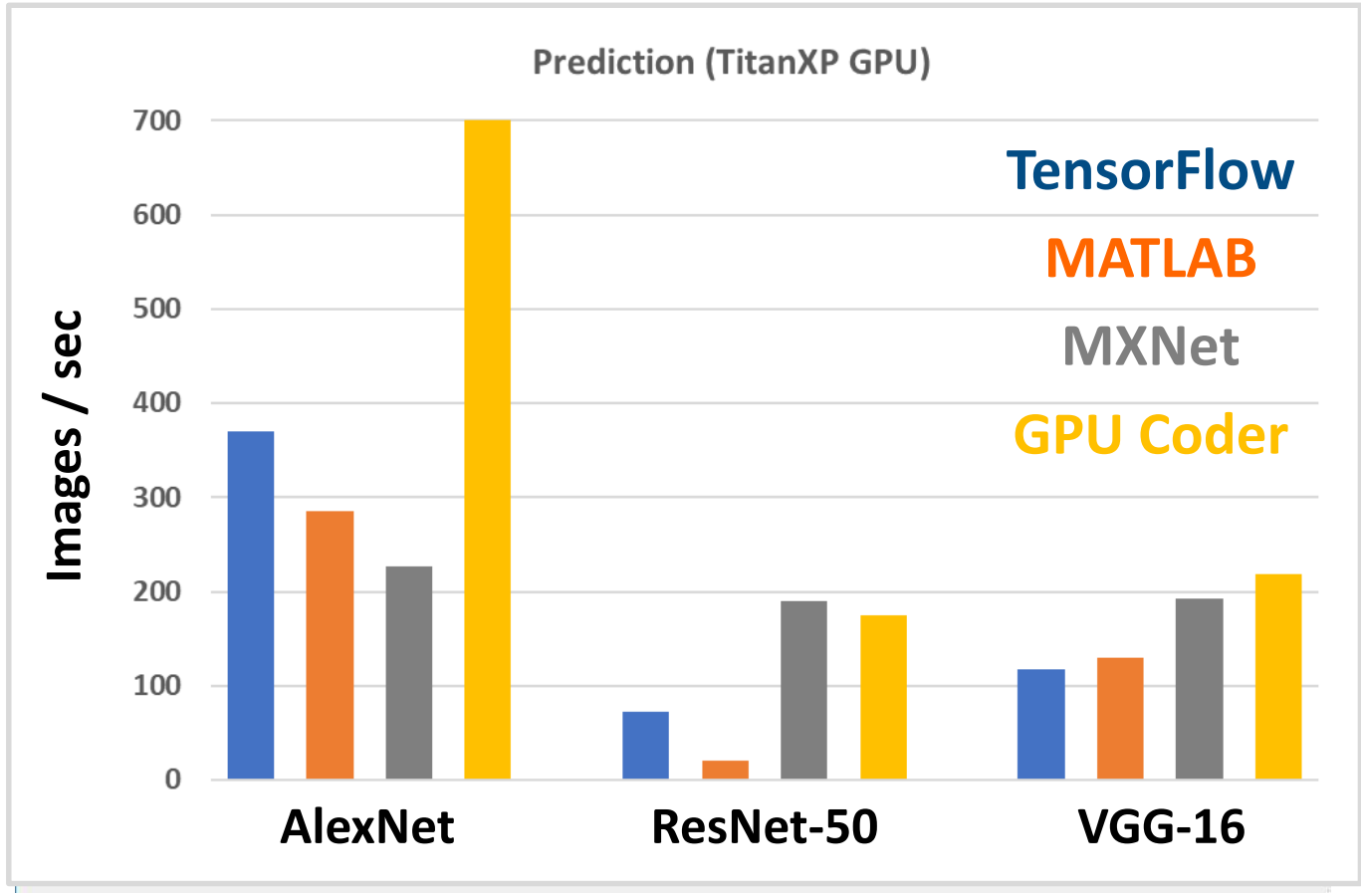


Output

Deep Learning

Design, build, and visualize neural networks

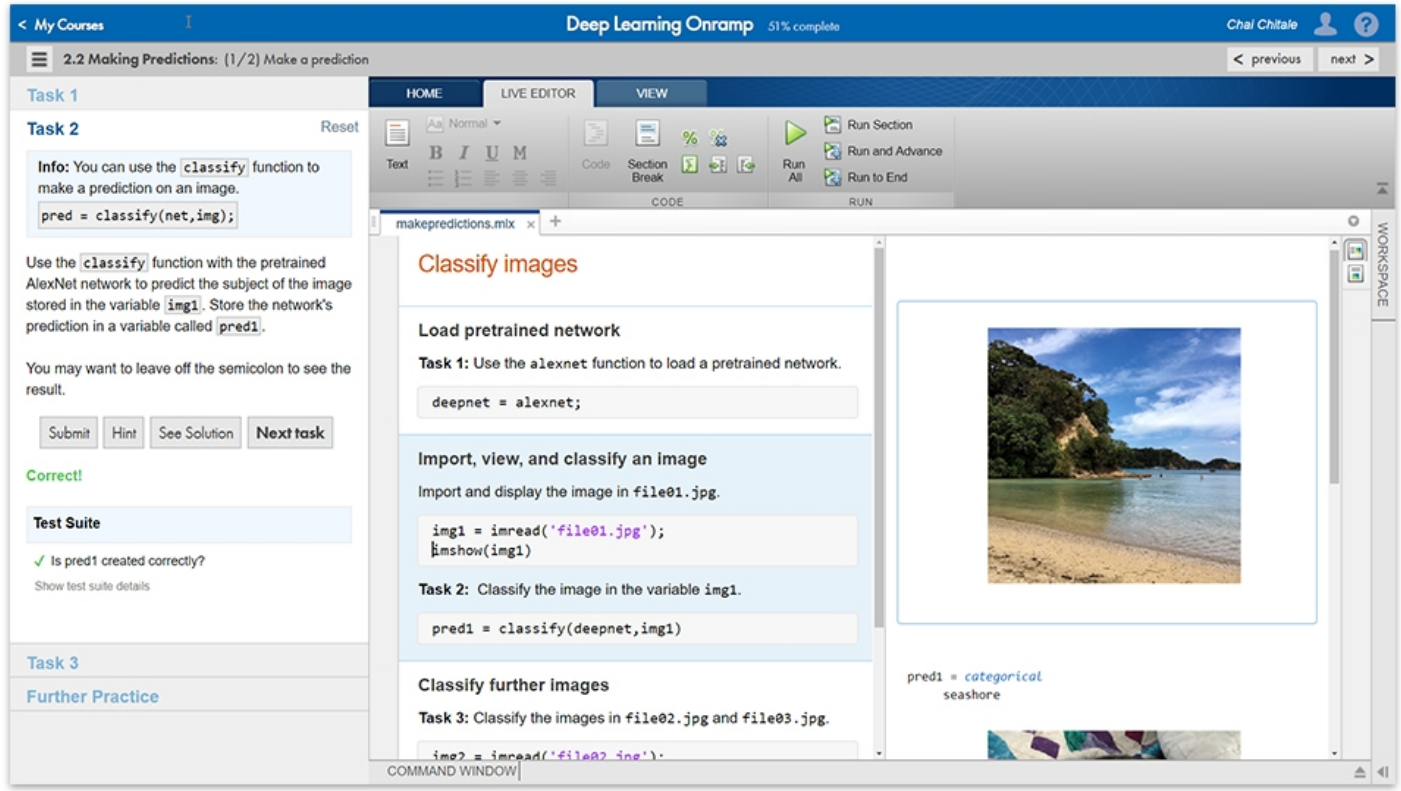
- Access the latest models
- Import pretrained models and use transfer learning
- Automate ground-truth labeling using apps
- Design and build your own models
- Use NVIDIA GPUs to train your models
- Automatically generate high-performance CUDA code for embedded deployment



FREE

Learn to Use MATLAB for Deep Learning in 2 Hours

Launch Deep Learning Onramp

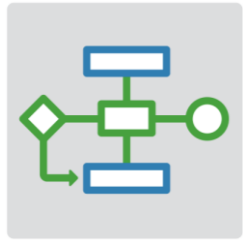


What's New in MATLAB and Simulink?

Platform Productivity

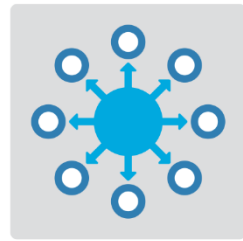
- Design Creation
- Analysis
- Simulation, Scaling
- Collaboration

Workflow Depth



- Code Generation
- Verification and Validation

Application Breadth



- Autonomous Systems
- Wireless Communications
- Artificial Intelligence (AI)

MATLAB EXPO 2018