

MATLAB EXPO

Share Simulink Simulations as Standalone Applications, Web Apps, and Enterprise Applications

Dr. Sunil Unnikrishnan
Ramanuja Jagannathan

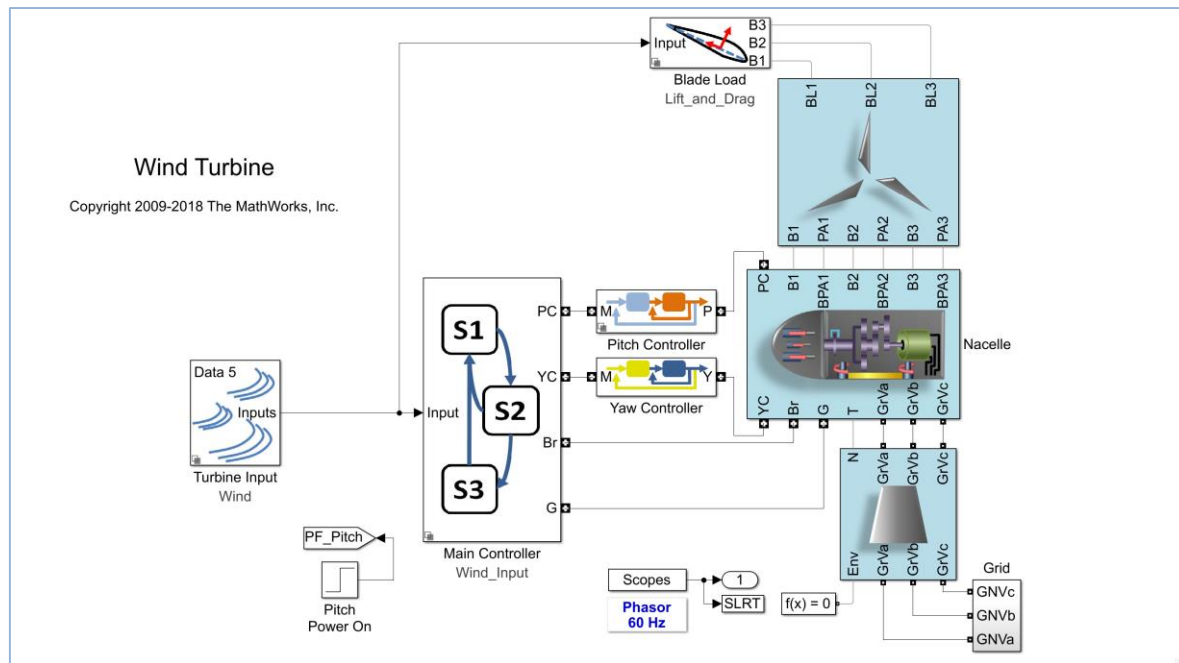


Key Takeaways

- Simulation goes beyond the design phase
- Simulation deployment made easy with Simulink Compiler
- Share simulations as standalone desktop apps, web apps, or enterprise applications

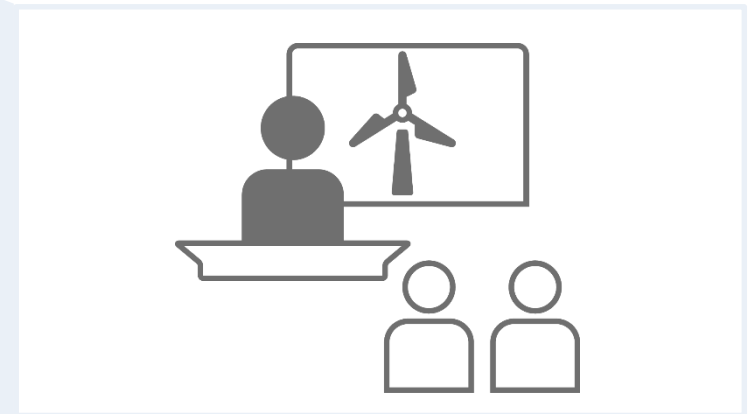
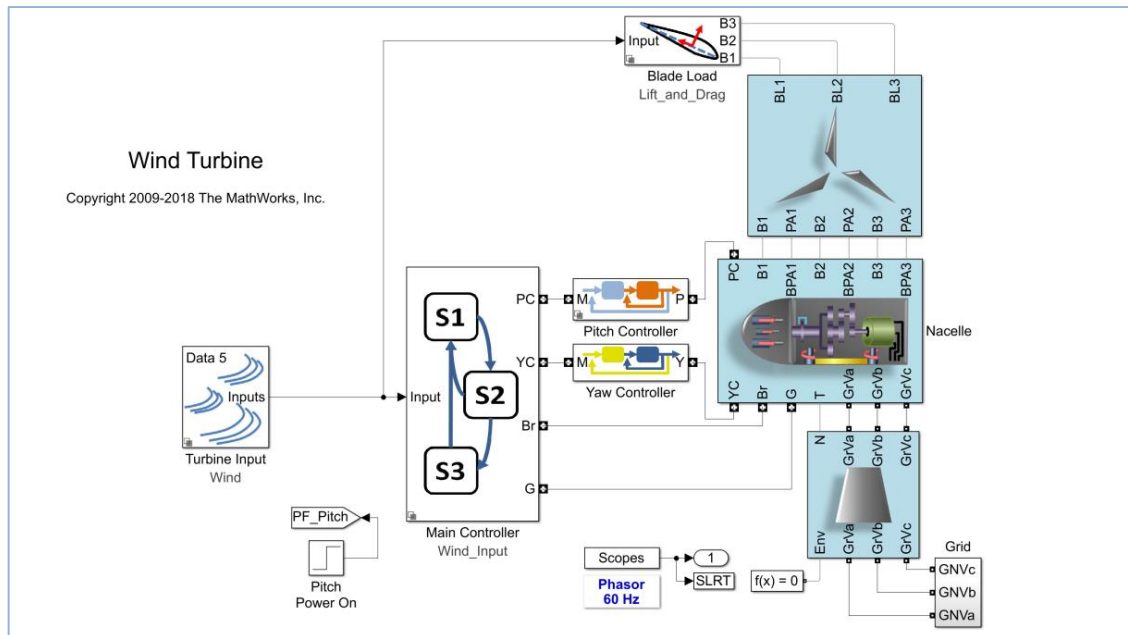
Your Simulation is Your Asset

- Simulation is critical to your system design, but it doesn't stop at design
- Maximize your simulation's value by re-using it



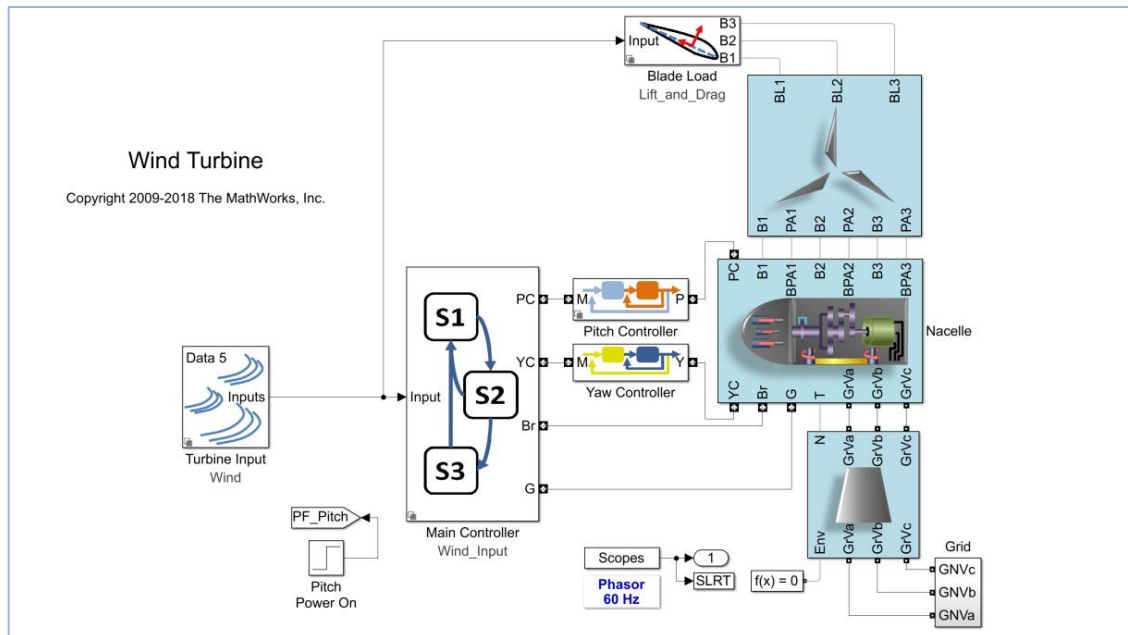
Re-use Your Simulation Beyond Design

- As a training / teaching tool



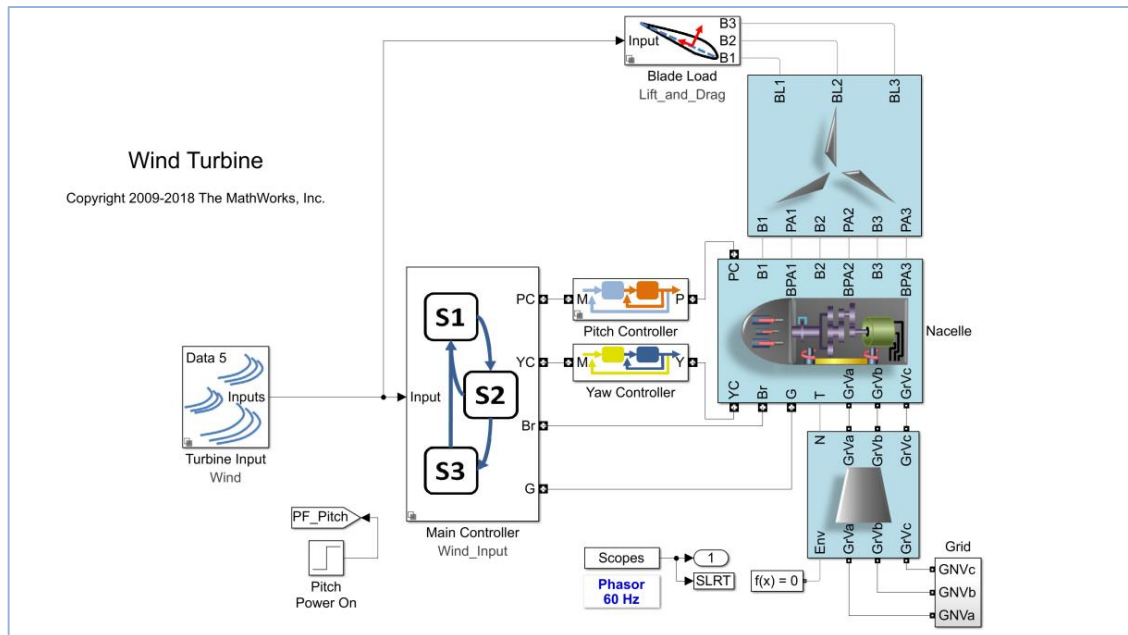
Re-use Your Simulation Beyond Design

- As a training / teaching tool
- As a product evaluation tool



Re-use Your Simulation Beyond Design

- As a training / teaching tool
- As a product evaluation tool
- In-operation usage, for example as a digital twin



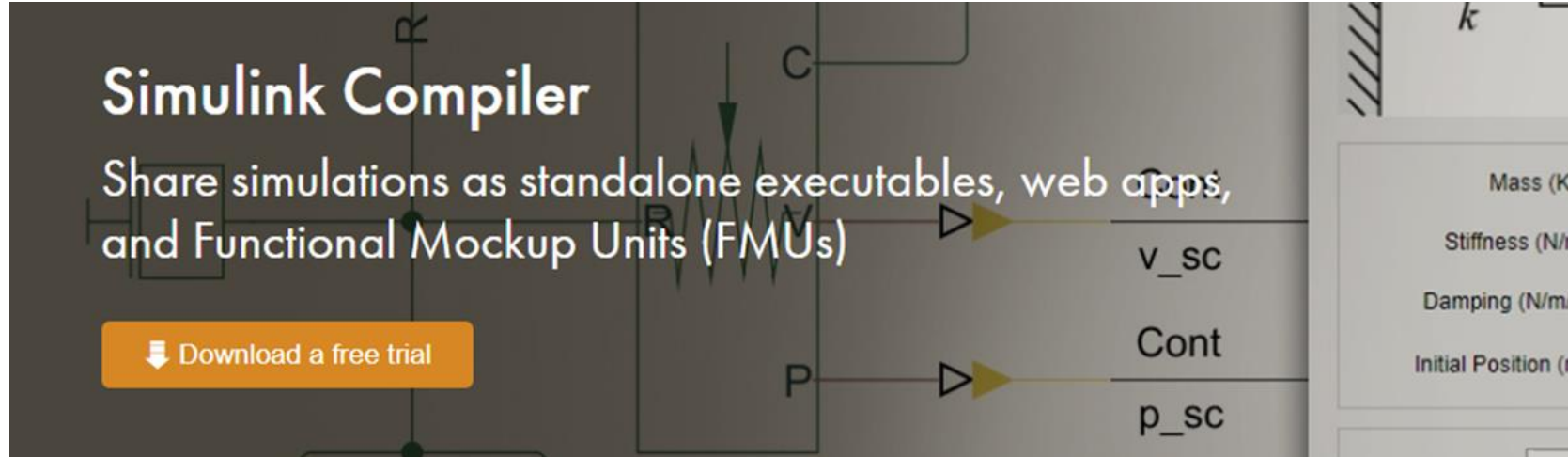
The Right Solution to Deploy Simulations

- Common traits of re-using your simulations beyond design
 - Simulation used as a black box for specific tasks
 - Simulation used for desktop or server applications
 - Many end users of simulations are not Simulink users
 - Reuse of existing Simulink models from Model-Based Design
- What is the right way to deploy the simulation for reuse?
 - No products seem to address your requirements entirely



Simulation Deployment Made Easy with Simulink Compiler

- An out-of-the-box solution to share simulations R2020a
 - Supports flexible simulation input / parameter tuning workflow
 - Supports a variety of Simulink simulation features including variable-step solvers
 - Royalty-free distribution

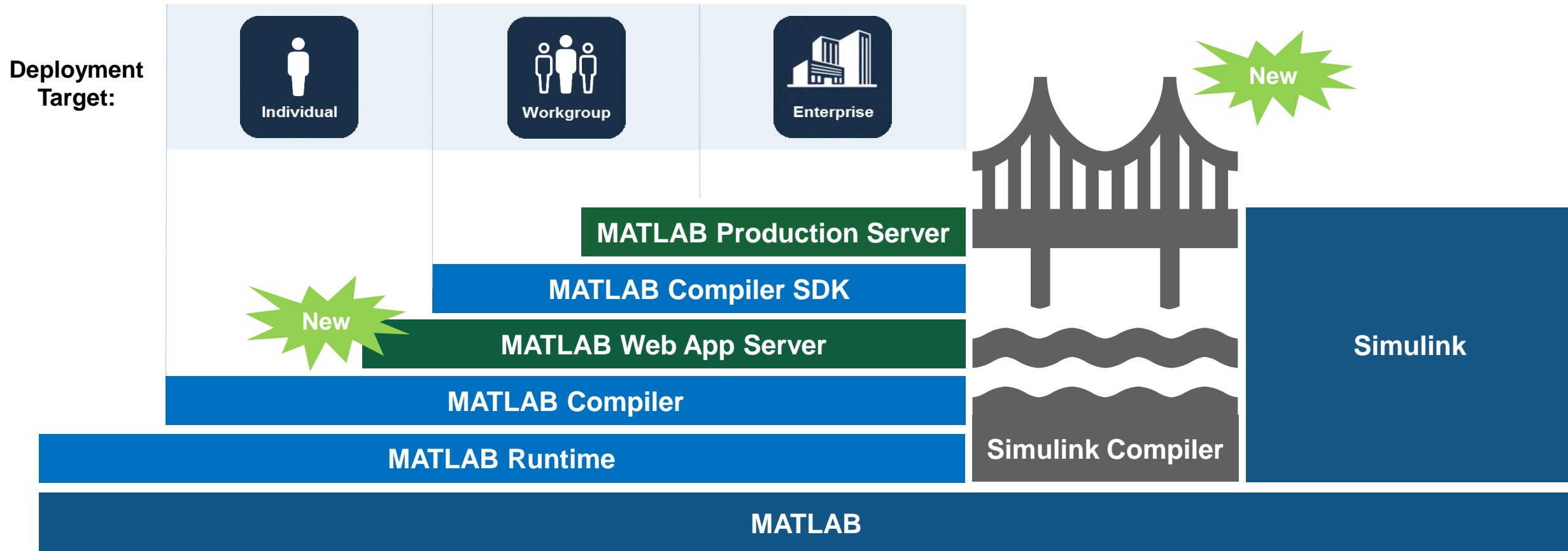


Simulink Compiler
Share simulations as standalone executables, web apps, and Functional Mockup Units (FMUs)

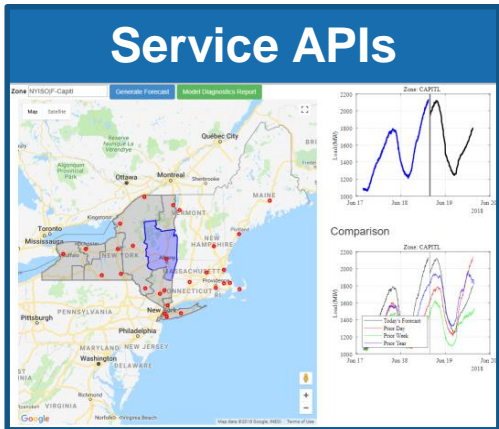
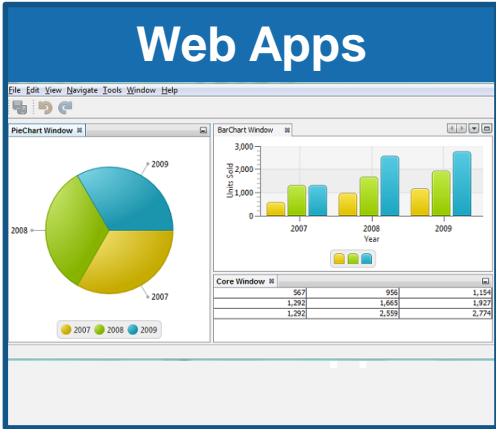
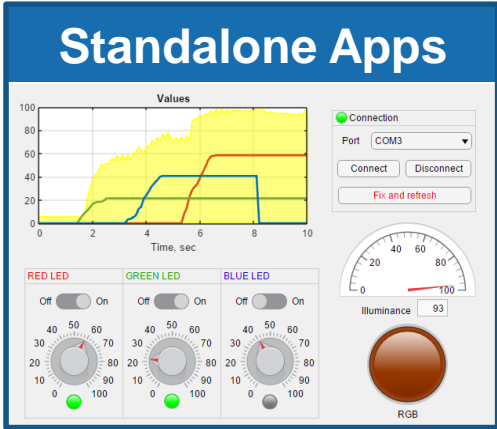
[Download a free trial](#)

The banner features a background image of a Simulink model. On the left, there's a control block with inputs labeled 'C' and 'P'. In the center, a scope block displays a signal waveform. On the right, a parameter block is visible with fields for 'Mass (Kg)', 'Stiffness (N/m)', 'Damping (N/m/s)', and 'Initial Position (m)'. Below the scope, there are two output ports labeled 'v_sc' and 'p_sc'.

New Additions to Application Deployment Product Portfolio



Supports a Full Spectrum of Simulation Deployment Scenarios



Personas in Simulation Deployment



- **Simulation Author:** They define, build, edit and *compile* Simulink simulations

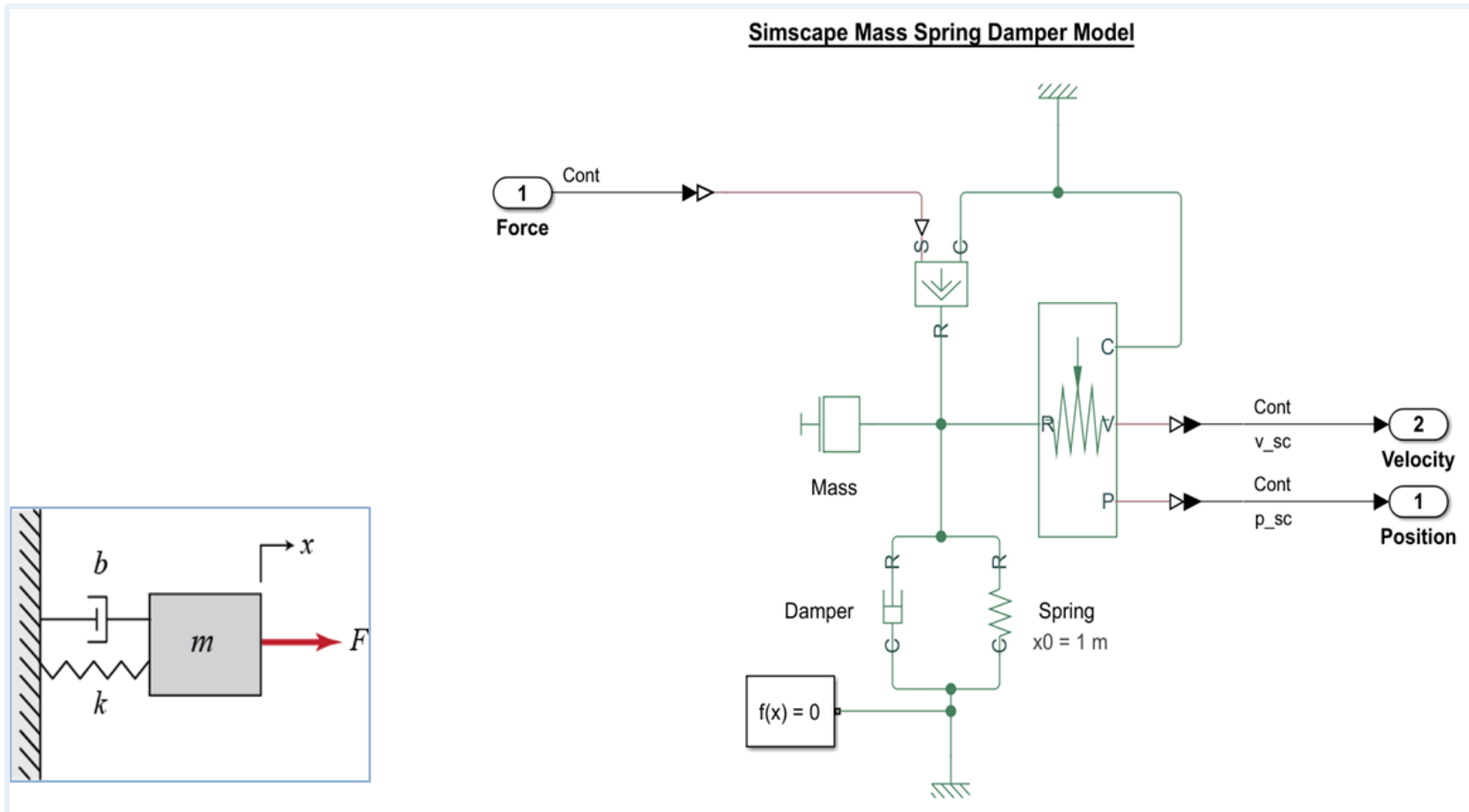


- **Simulation User:** They run, tune, and analyze the deployed simulations



- **IT:** They support integrating deployed simulations with IT systems

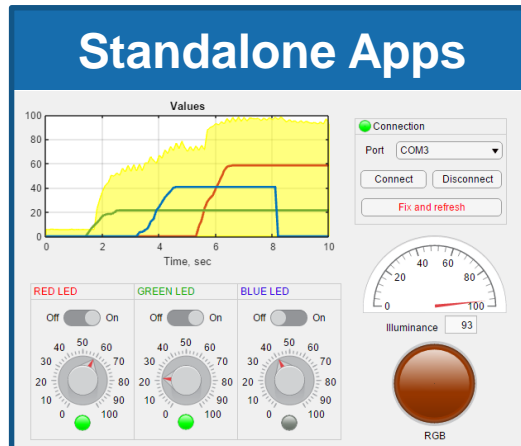
A “Hello, World” Example



Four tunable parameters:

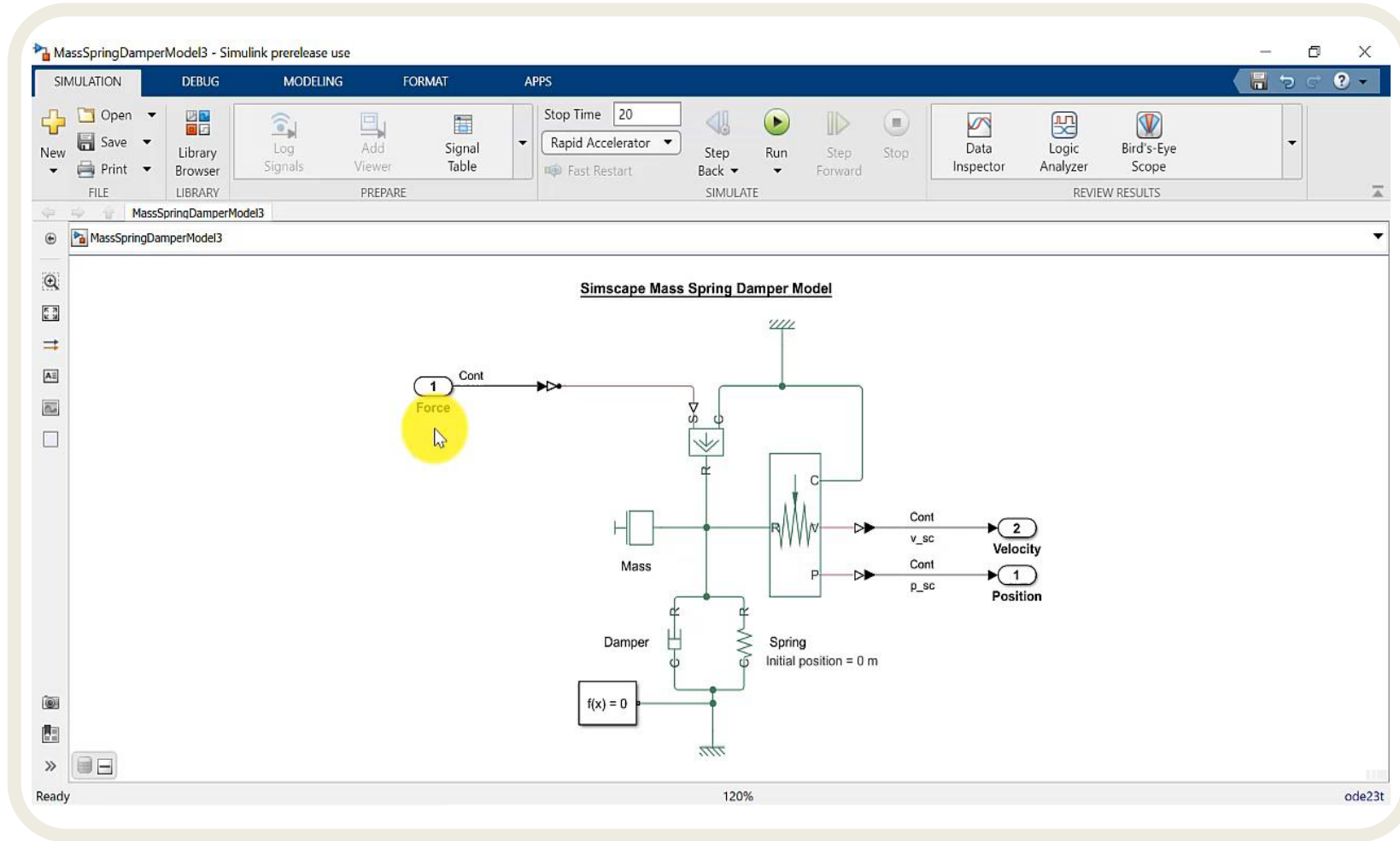
- Mass
- Initial position
- Damping coefficient
- Spring stiffness

Scenario 1: Standalone Desktop App



- Runs on PC
- Can use App Designer GUI
- Needs local installation

Scenario 1: Standalone Desktop App



Simulation Author

Use App Designer to create simulation apps

Scenario 1: Standalone Desktop App

App Designer - C:\Users\weiwul\Desktop\SK launch activities\SKO_presentation_simple_demo\msd_Simsacpe\MassSpringDamperAppV3.mlapp

DESIGNER EDITOR

New Open Save App Share Run

FILE SHARE RUN

MassSpringDamperAppV3.mlapp

CODE BROWSER

Callbacks | Functions | Properties

Search

startupFcn

APP LAYOUT

Input Force

Position

Velocity

Mass (Kg) 2

Stiffness (Nm) 128

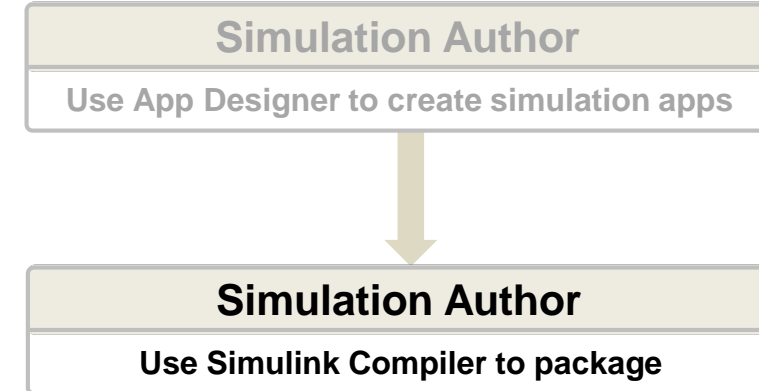
Damping (Nm/s) 3

Initial Position (m) 0

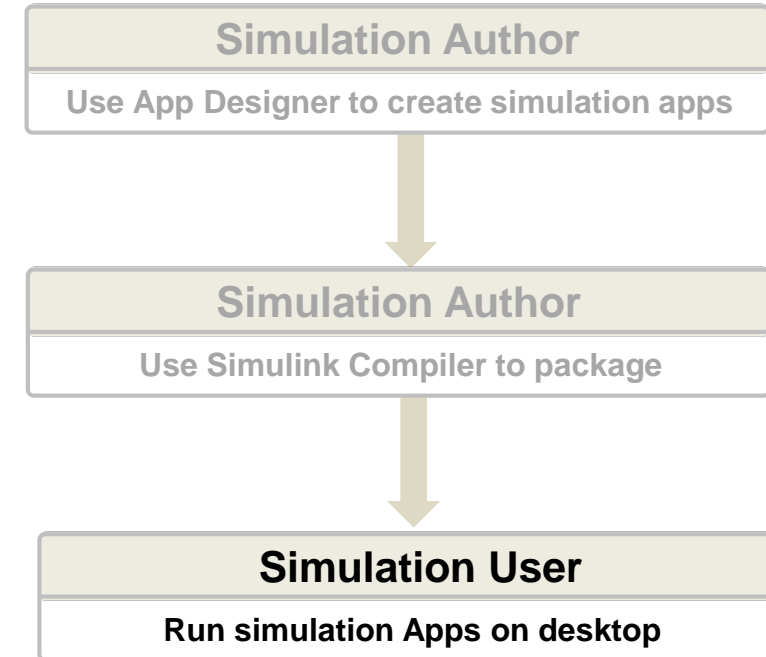
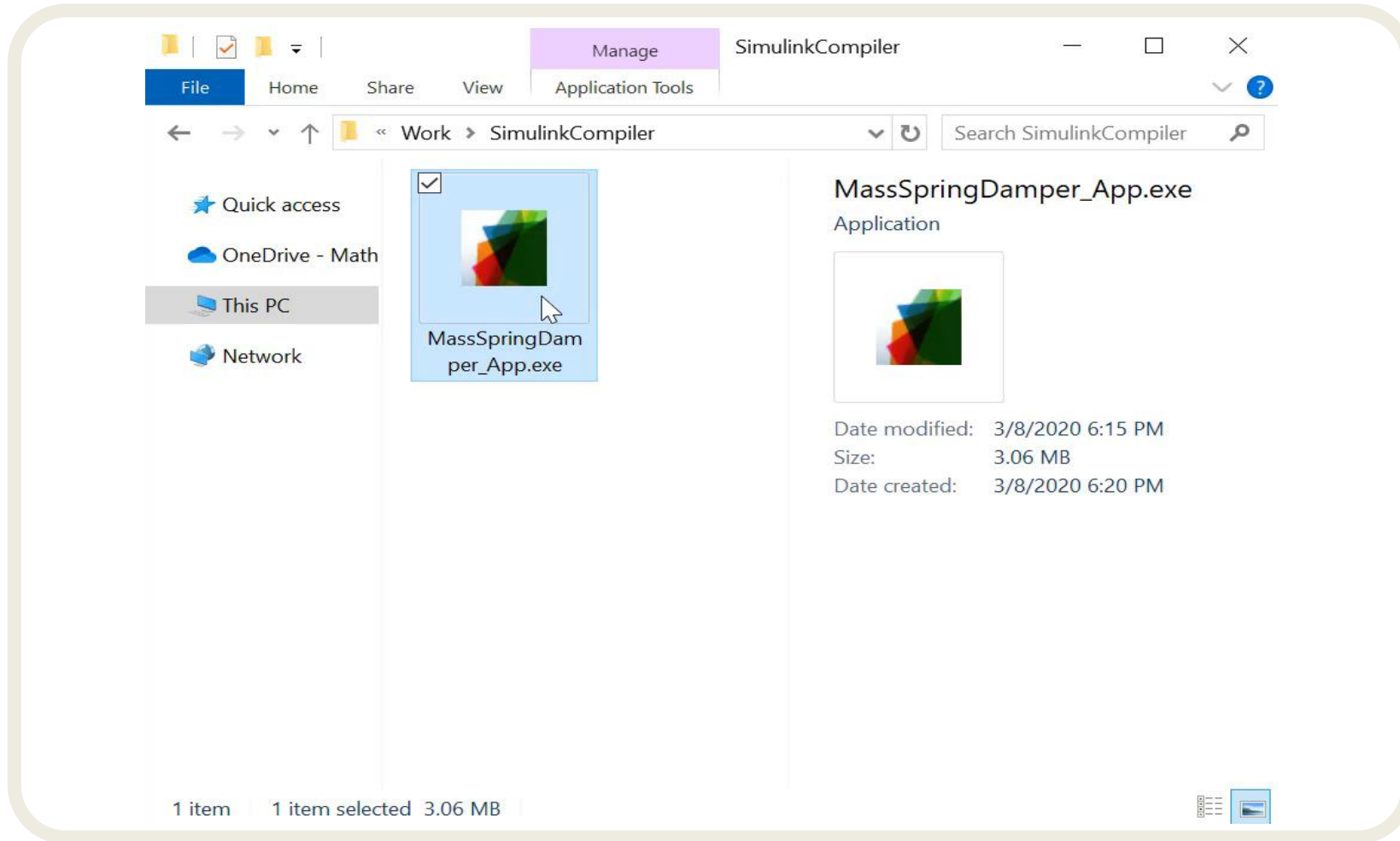
Input Force (N) 10 Gate

Stop Time (s) 20 Simulate

```
1 classdef MassSpringDamperAppV3 < matlab.apps.AppBase
2
3     % Properties that correspond to app components
4     properties (Access = public)
5         MassSpringDamperUIFigure    matlab.ui.Figure
6         GridLayout0                 matlab.ui.container.GridLayout
7         GridLayout11                matlab.ui.container.GridLayout
8         Panel112                    matlab.ui.container.Panel
9         GridLayout112               matlab.ui.container.GridLayout
10        StiffnessNmSpinnerLabel      matlab.ui.control.Label
11        StiffnessSpinner             matlab.ui.control.Spinner
12        MassKgLabel                  matlab.ui.control.Label
13        MassSpinner                  matlab.ui.control.Spinner
14        DampingNmsSpinnerLabel       matlab.ui.control.Label
15        DampingSpinner              matlab.ui.control.Spinner
16        InitialPositionmEditFieldLabel matlab.ui.control.Label
17        InitialPositionEditField     matlab.ui.control.NumericEditField
18        Panel                         matlab.ui.container.Panel
19        GridLayout115                matlab.ui.container.GridLayout
20        StopTimesSpinnerLabel        matlab.ui.control.Label
21
```



Scenario 1: Standalone Desktop App



Scenario 2: Web App



- Runs on a Server (MATLAB Web App Server)
- Uses App Designer GUI
- Browser-based access, no local installation needed

Scenario 2: Web App

The screenshot displays the MATLAB App Designer interface for a simulation app named 'MassSpringDamperAppV3.mlapp'. The interface is divided into several sections:

- DESIGNER:** Contains a toolbar with icons for Save, Callback, Function, Property, App Input Arguments, Go To, Comment, Indent, Enable app coding alerts, Show Tips, and Run.
- EDITOR:** Contains a toolbar with icons for FILE, INSERT, NAVIGATE, EDIT, VIEW, RESOURCES, and RUN.
- CODE BROWSER:** Shows the class definition for 'MassSpringDamperAppV3' which inherits from 'matlab.apps.AppBase'. The code includes a 'properties' block listing various UI components like 'MassSpringDamperUIFigure', 'GridLayout0', 'GridLayout11', 'Panel112', 'GridLayout112', 'StiffnessNmSpinnerLabel', 'StiffnessSpinner', 'MassKgLabel', 'MassSpinner', 'DampingNmsSpinnerLabel', 'DampingSpinner', 'InitialPositionmEditFieldLabel', 'InitialPositionEditField', 'Panel', 'GridLayout115', 'StopTimesSpinnerLabel', 'StopTimeSpinner', 'SimulateButton', 'InputForceShapeDropDown', 'InputForceMagnitudeSpinner', 'InputForceLabel', and 'Image'.
- APP LAYOUT:** Shows a schematic of a mass-spring-damper system with a mass m , spring constant k , and damping coefficient b . Below the schematic are input fields for Mass (Kg), Stiffness (N/m), Damping (N/m/s), and Initial Position (m). There are also input fields for Input Force (N) and Stop Time (s), along with a 'Simulate' button.
- COMPONENT BROWSER:** Lists the components used in the app layout.

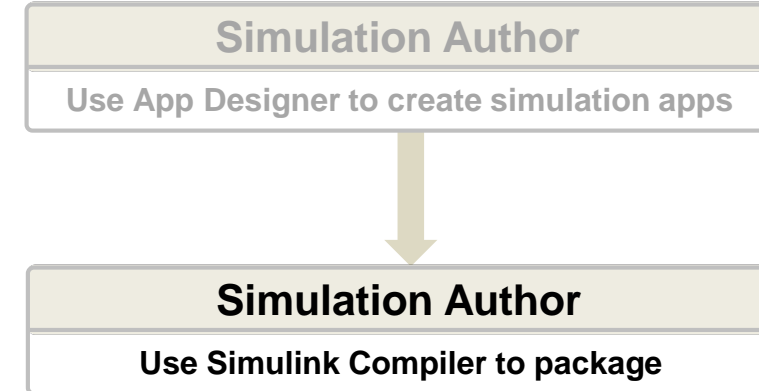
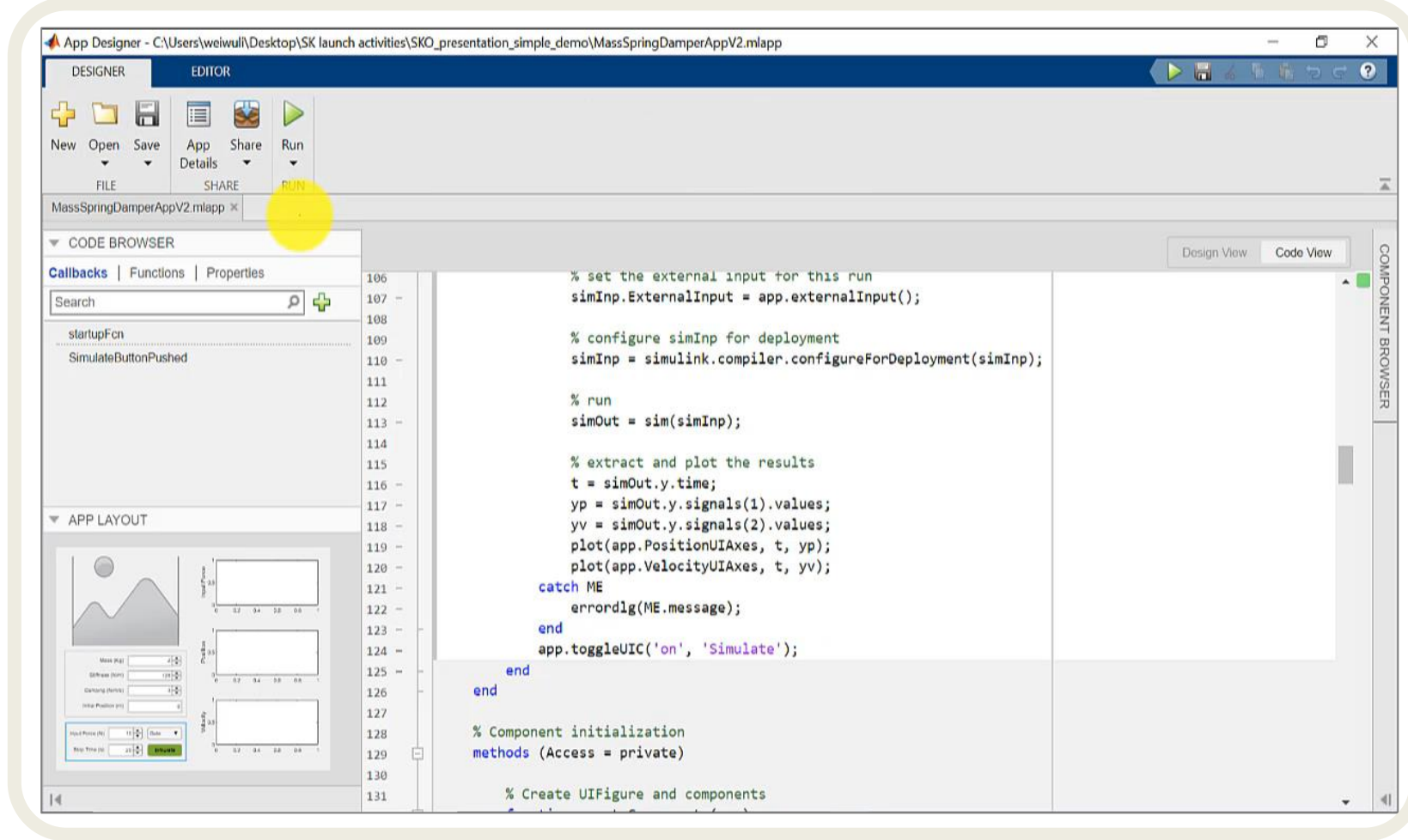
The same step as designing a standalone desktop App

Simulation Author

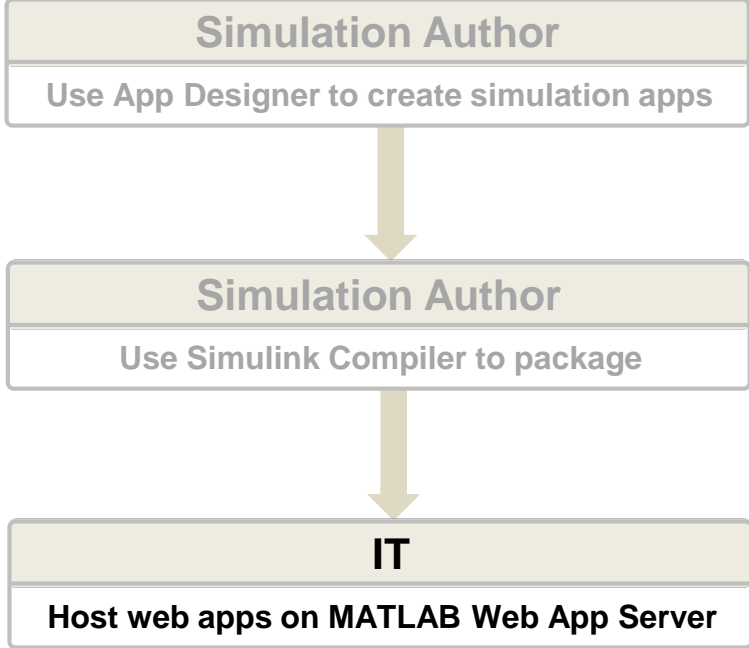
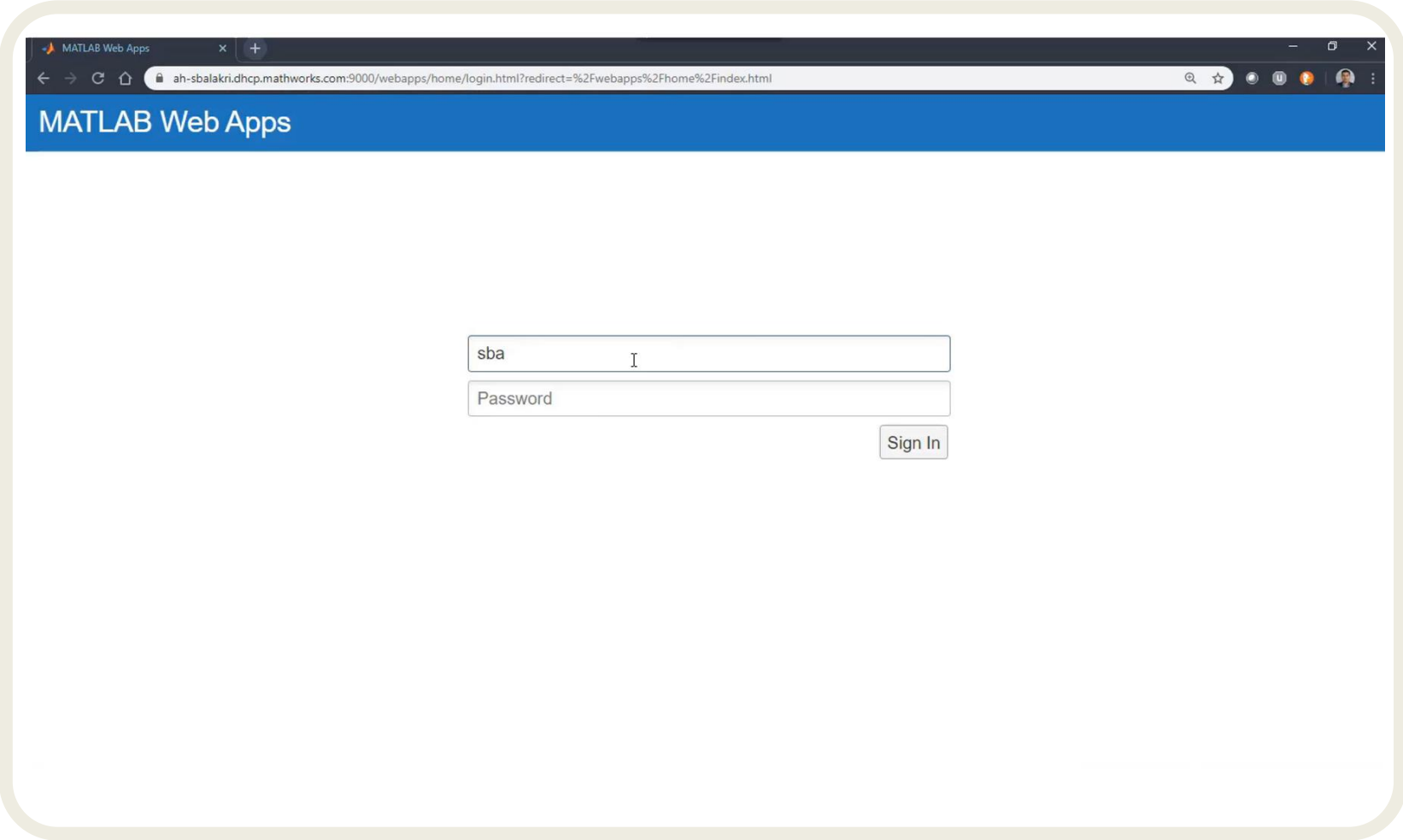
Use App Designer to create simulation apps

Scenario 2: Web App

The simulation app is packaged as a MATLAB Web App archive file (.ctf)

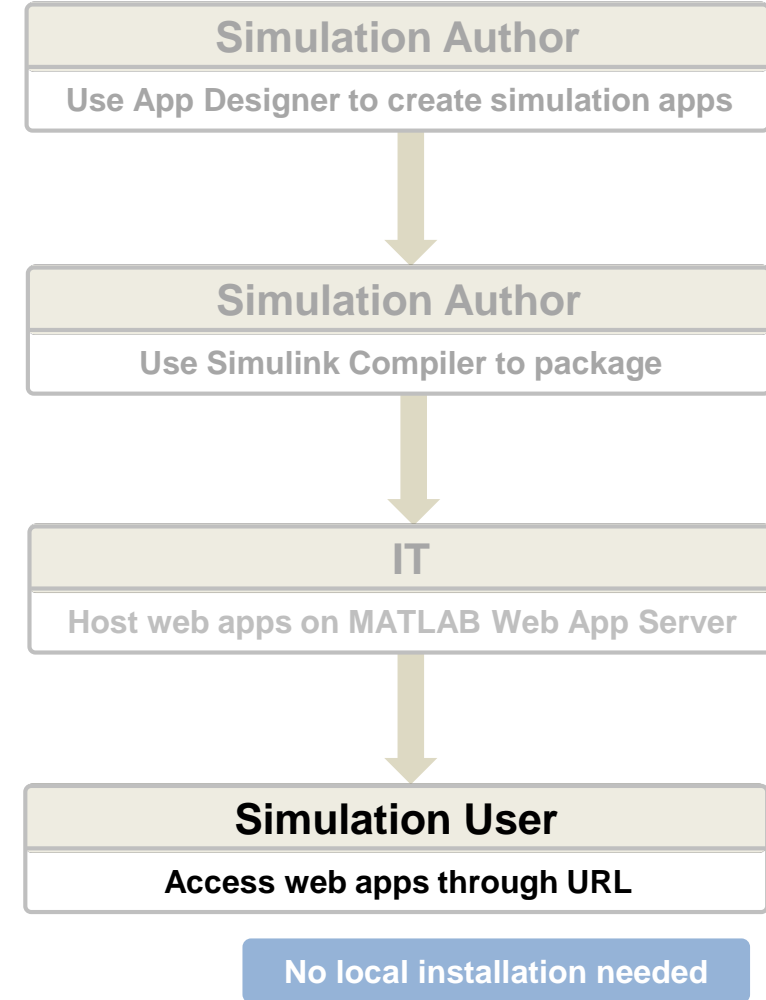
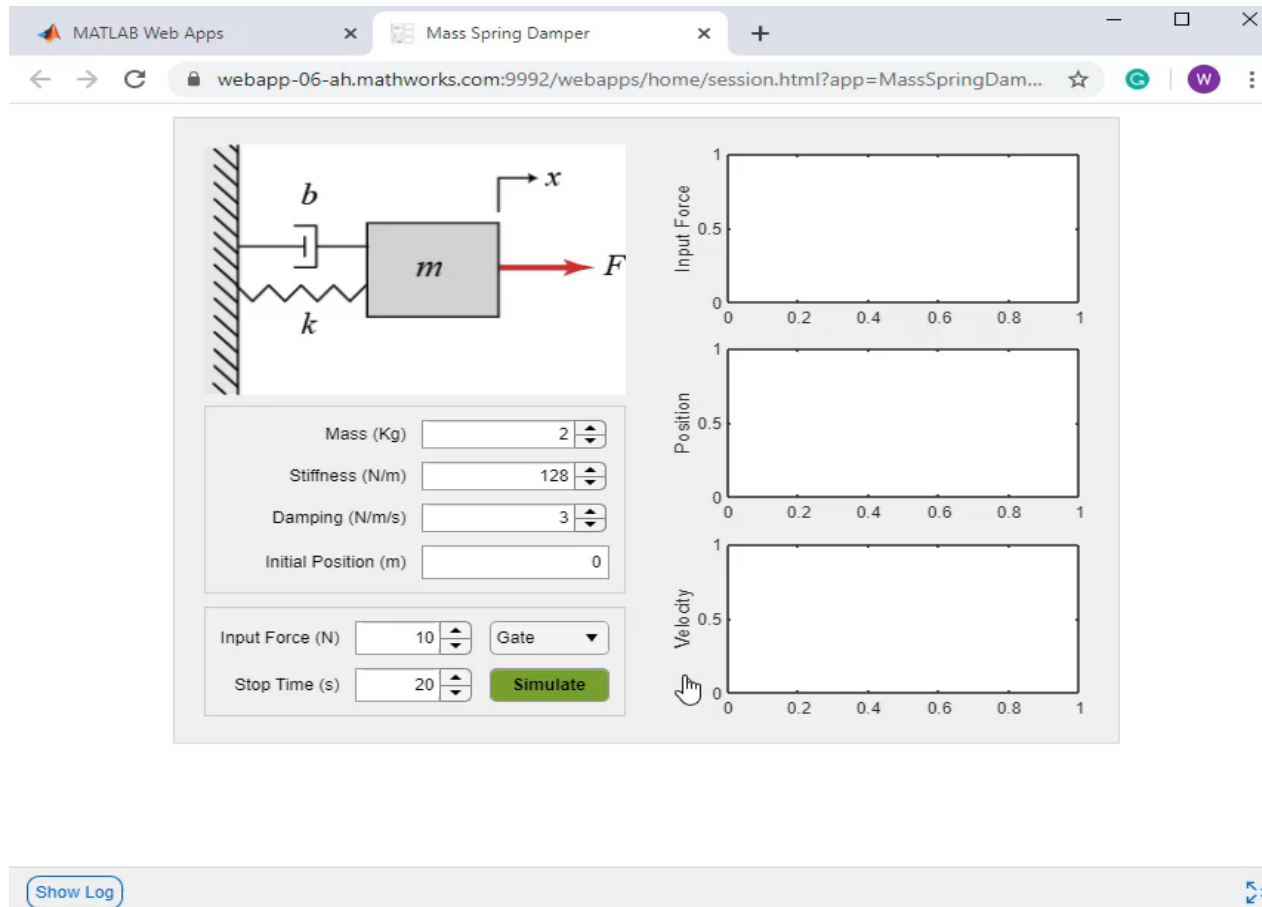


Scenario 2: Web App

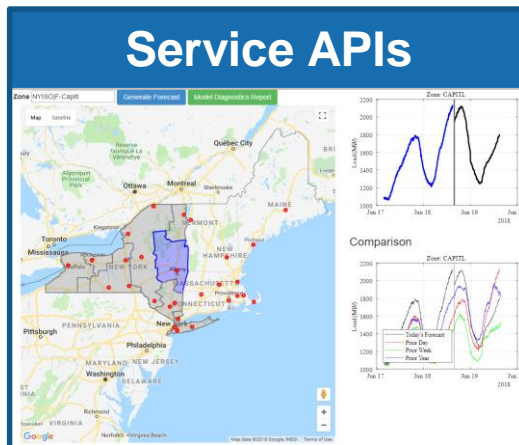


NEW
MATLAB Web App Server:
Host and share Simulink simulation apps created using MATLAB App Designer

Scenario 2: Web App

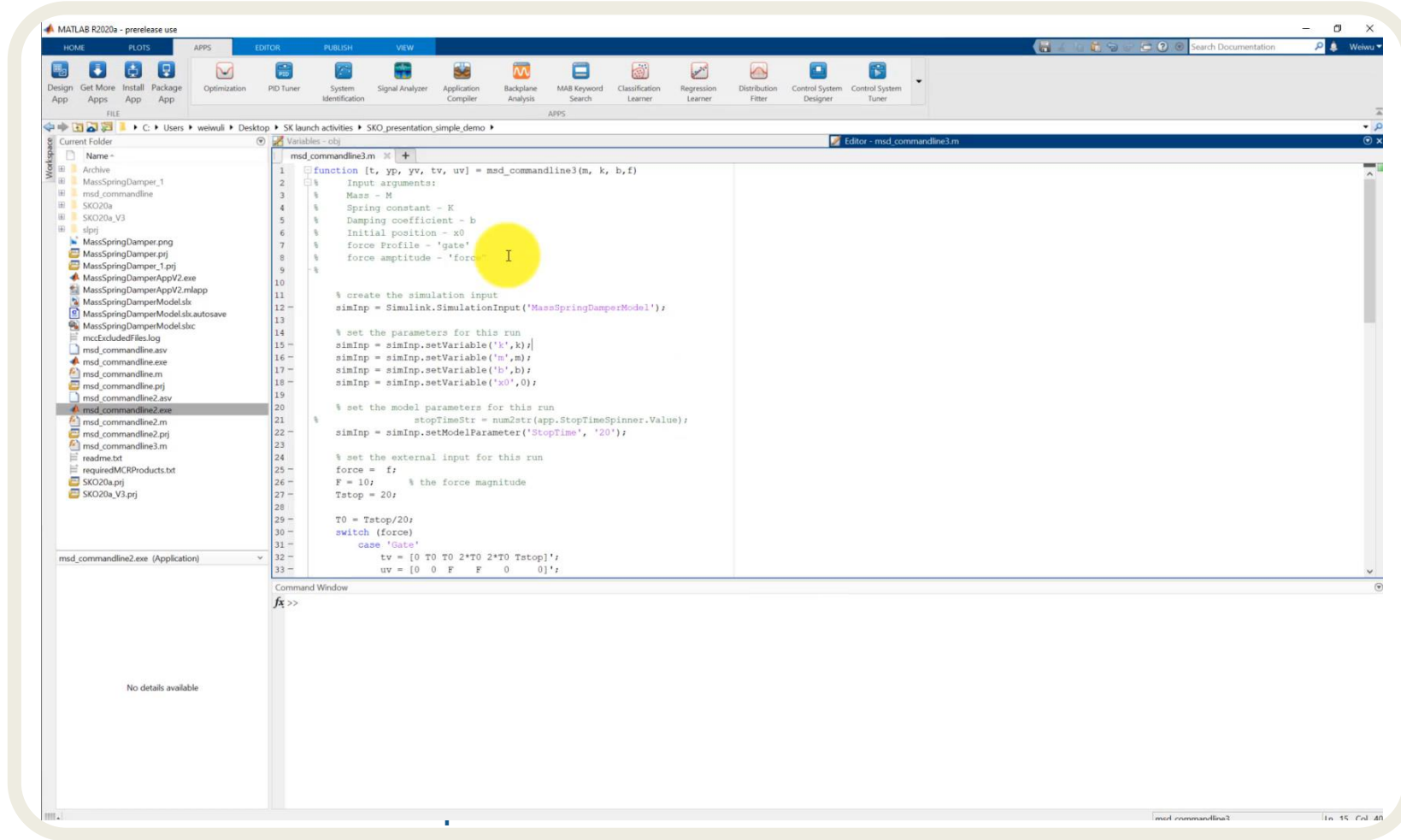


Scenario 3: Service API



- Runs on a Server (MATLAB Production Server)
- Supports customer developed client-server App and web app e.g. HTML/JavaScript
- Centrally hosted, no local installation needed

Scenario 3: Service API

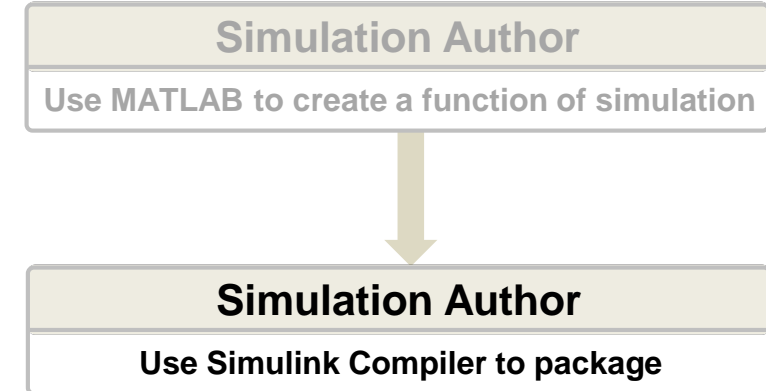
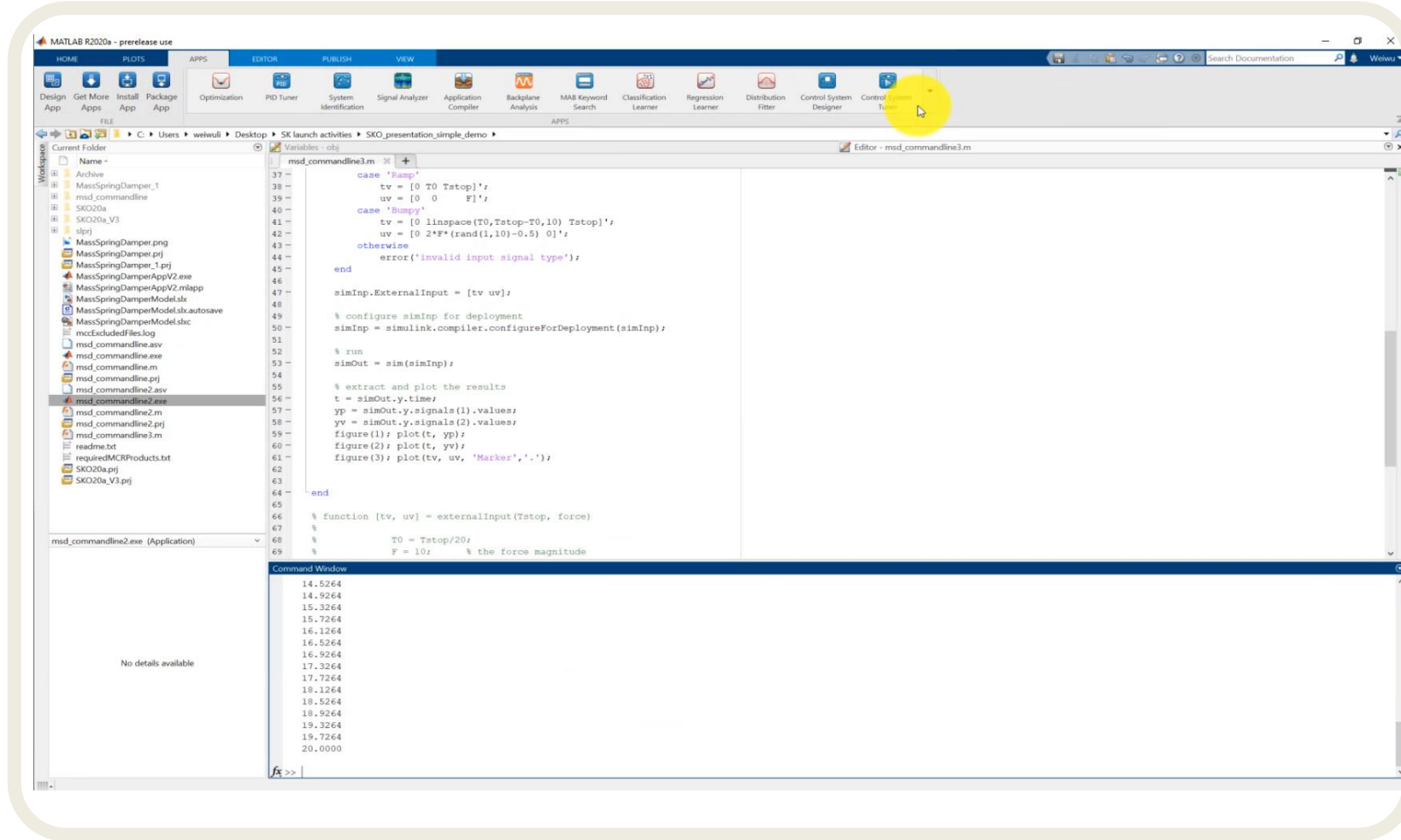


Simulation Author

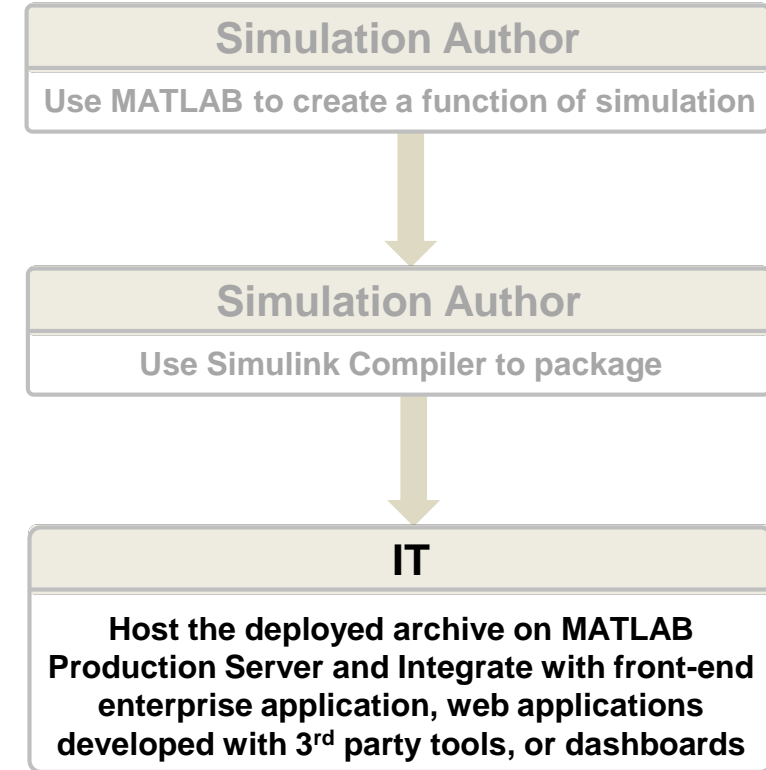
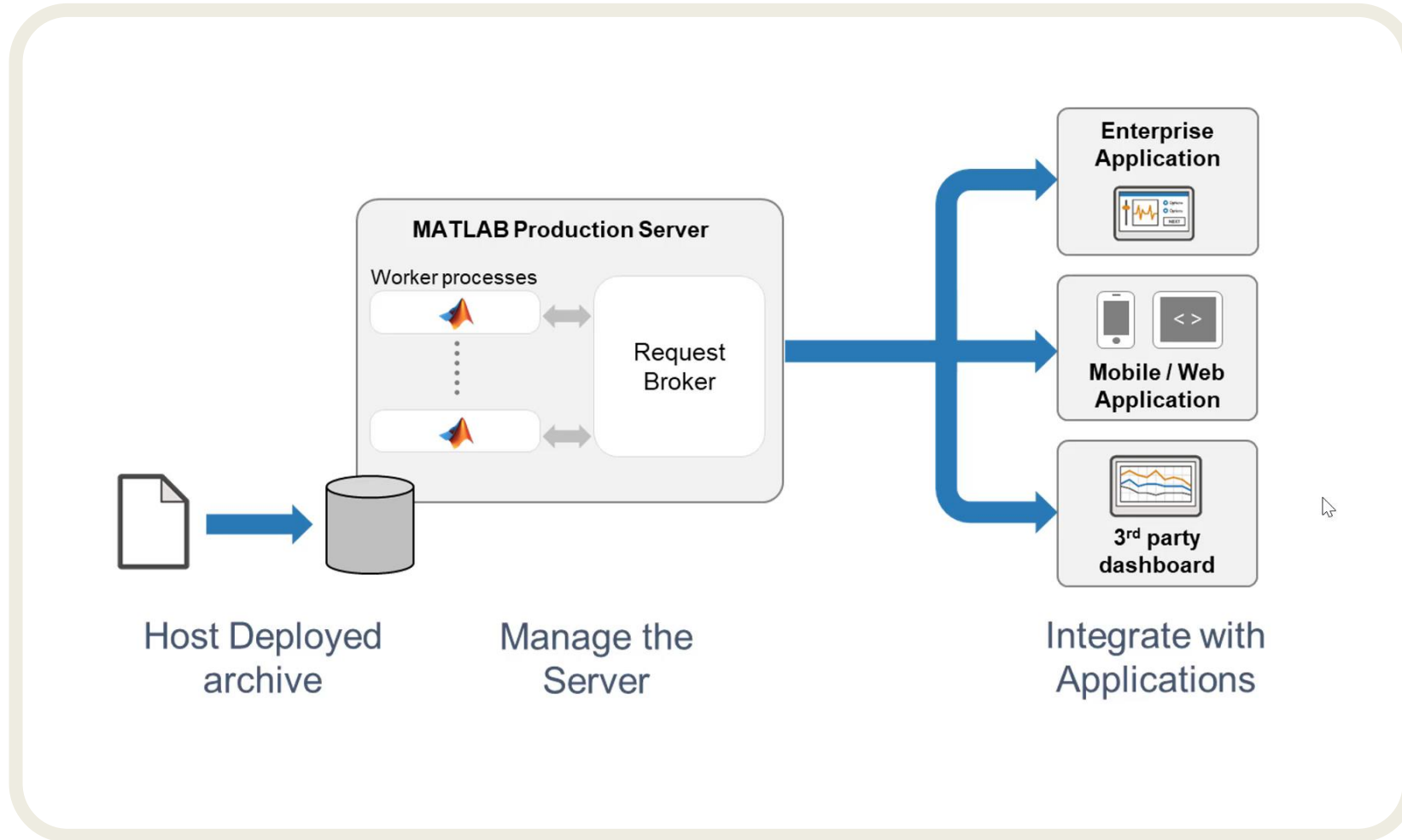
Use MATLAB to create a function of simulation

Scenario 3: Service API

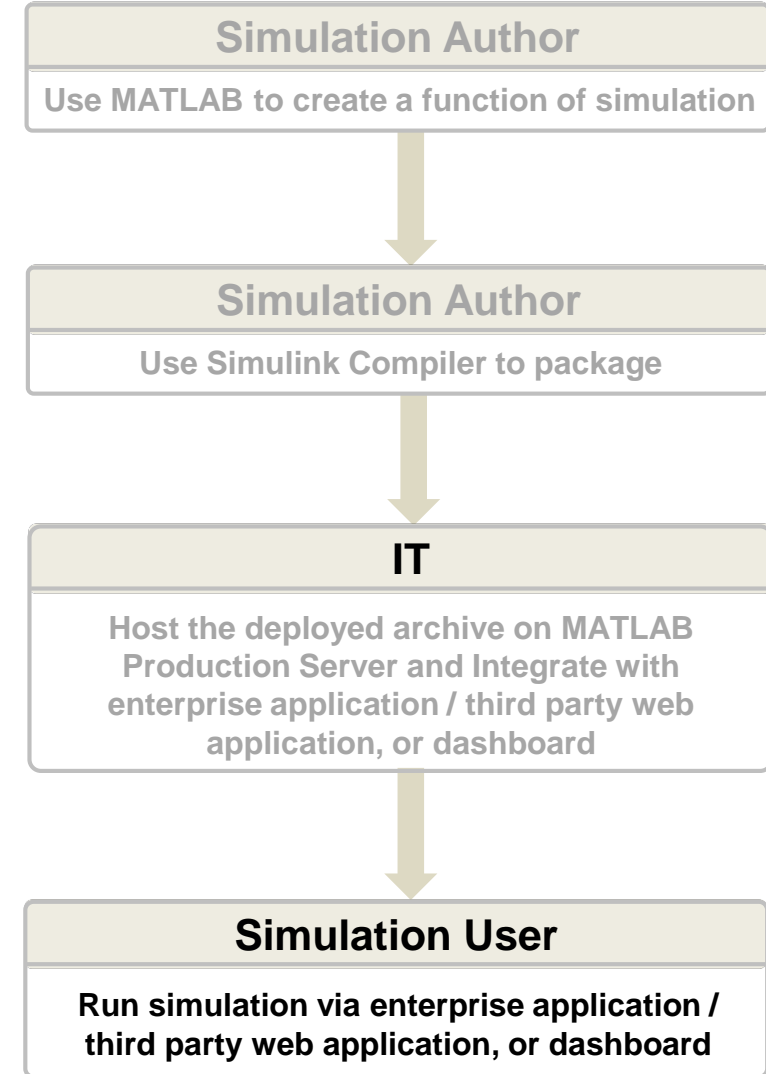
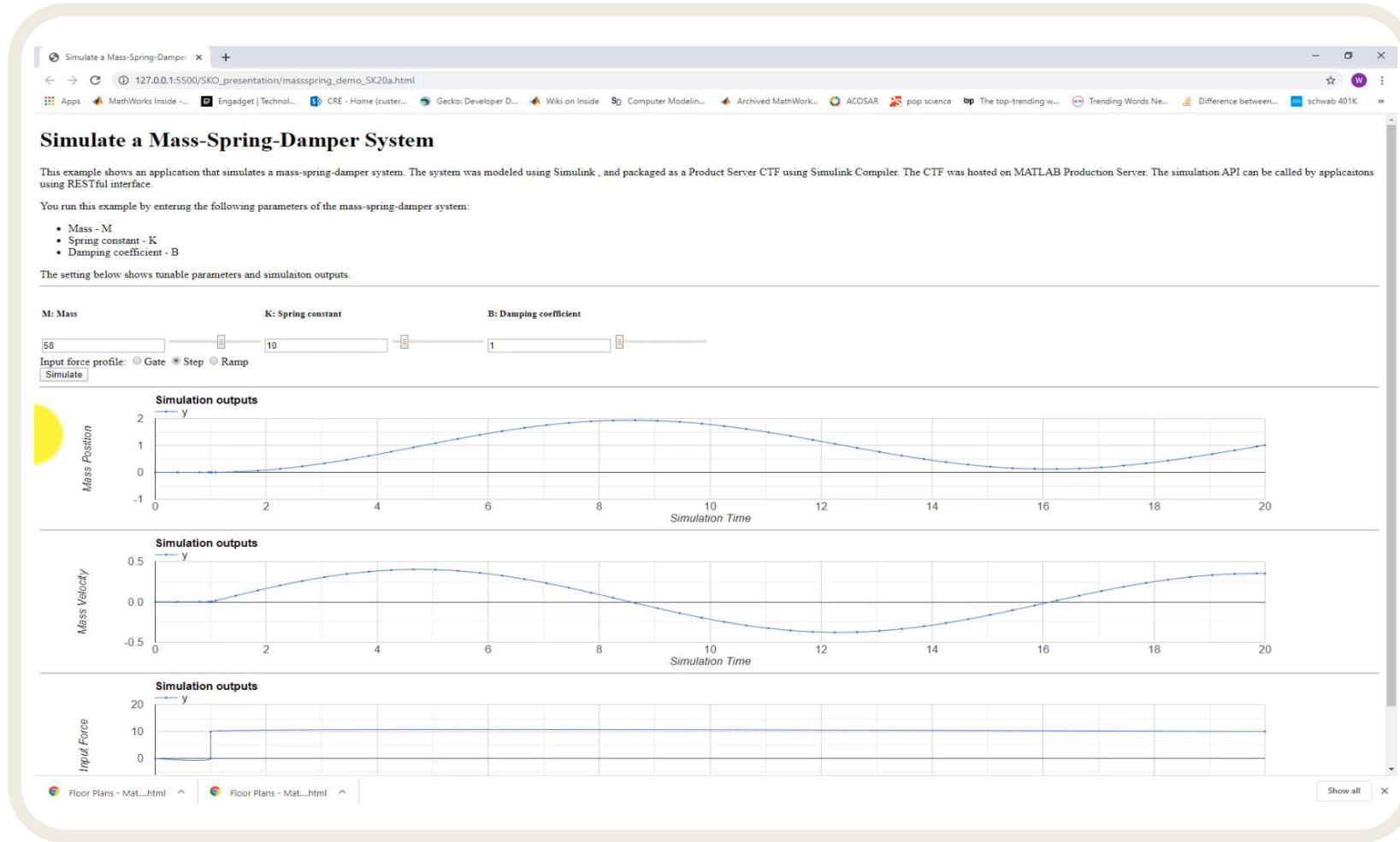
Package the simulation function as a deployable archive (.ctf)



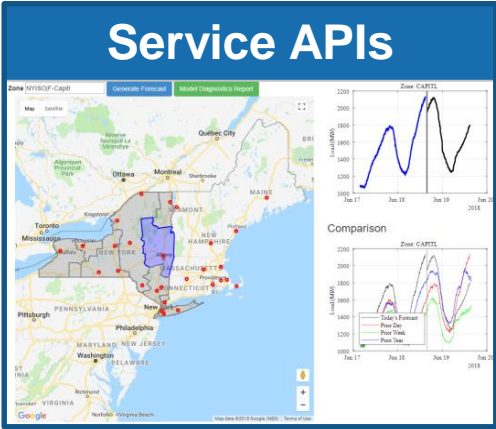
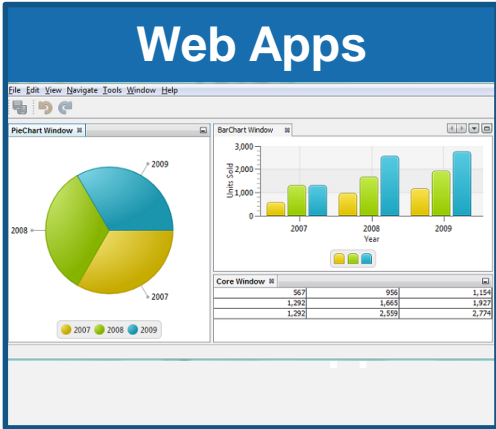
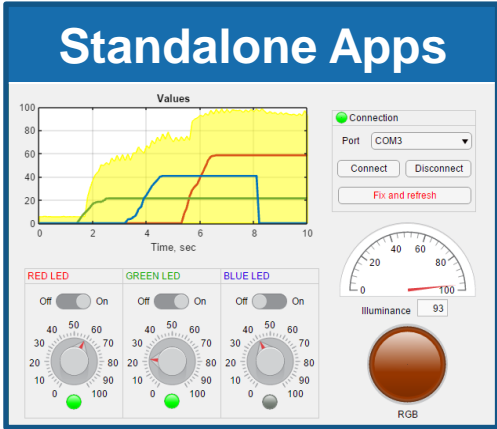
Scenario 3: Service API



Scenario 3: Service API



Supports a Full Spectrum of Simulation Deployment Scenarios



Summary

- Simulation goes beyond the design phase
- Simulation deployment made easy with Simulink Compiler
- Share simulations as standalone desktop apps, web apps, or enterprise applications

Learn More

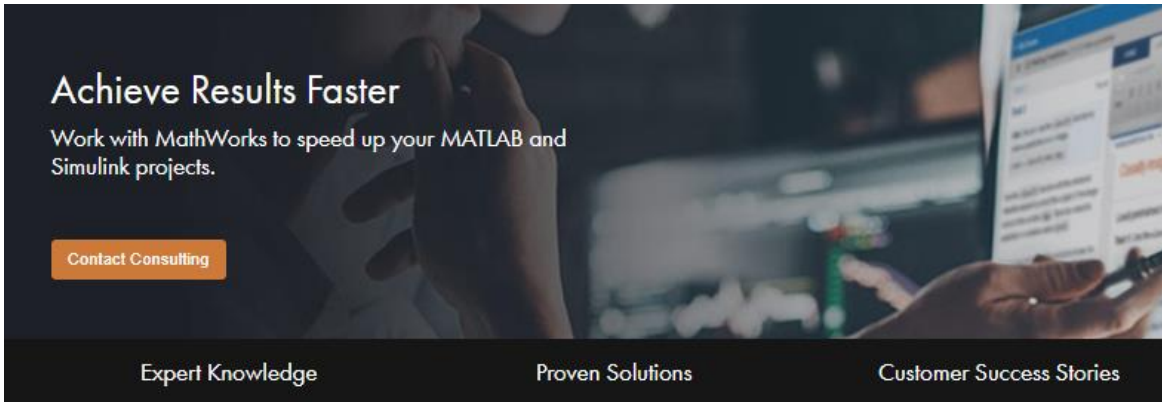
A banner for Simulink Compiler featuring a blurred background of a Simulink block diagram. The text is centered and reads: "Simulink Compiler" in a large font, followed by "Share simulations as standalone executables, web apps, and Functional Mockup Units (FMUs)" in a smaller font. Below this is an orange button with a white arrow icon and the text "Request a free trial".

Simulink Compiler
Share simulations as standalone executables, web apps,
and Functional Mockup Units (FMUs)

[Request a free trial](#)

<https://www.mathworks.com/products/simulink-compiler.html>

MathWorks Consulting Service

A banner for MathWorks Consulting Service with a background image of hands pointing at a laptop screen. The text on the left reads: "Achieve Results Faster" in a large font, followed by "Work with MathWorks to speed up your MATLAB and Simulink projects." in a smaller font. Below this is an orange button with the text "Contact Consulting". At the bottom, there are three white text elements: "Expert Knowledge", "Proven Solutions", and "Customer Success Stories".

Achieve Results Faster
Work with MathWorks to speed up your MATLAB and
Simulink projects.

[Contact Consulting](#)

Expert Knowledge Proven Solutions Customer Success Stories

<https://www.mathworks.com/services/consulting.html>

MathWorks Training Service

A banner for MathWorks Training Service with a background image of a person working at a computer. The text in the center reads: "Advance Your Skills with MATLAB and Simulink Courses" in a large font. Below this is a link that says "Download course catalog".

**Advance Your Skills with MATLAB
and Simulink Courses**

[Download course catalog](#)

<https://www.mathworks.com/services/training.html>

Know mo

