

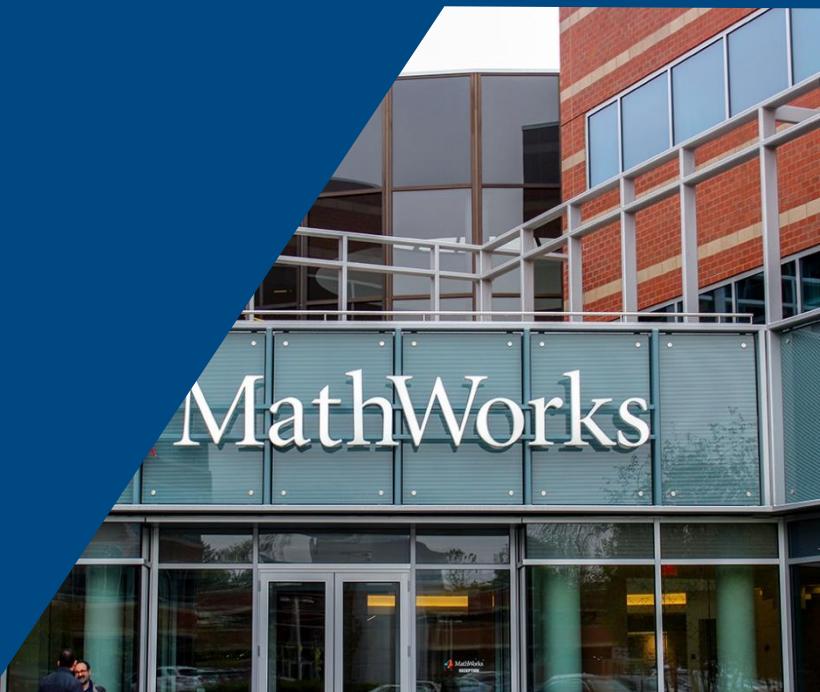


Introduction to MATLAB: Low Code Data Analysis



Armando Garcia

Customer Success Engineer

A photograph of the MathWorks headquarters building, a modern structure with a glass facade and a red brick upper section. The word 'MathWorks' is prominently displayed in white on the glass. The building is set against a clear sky.

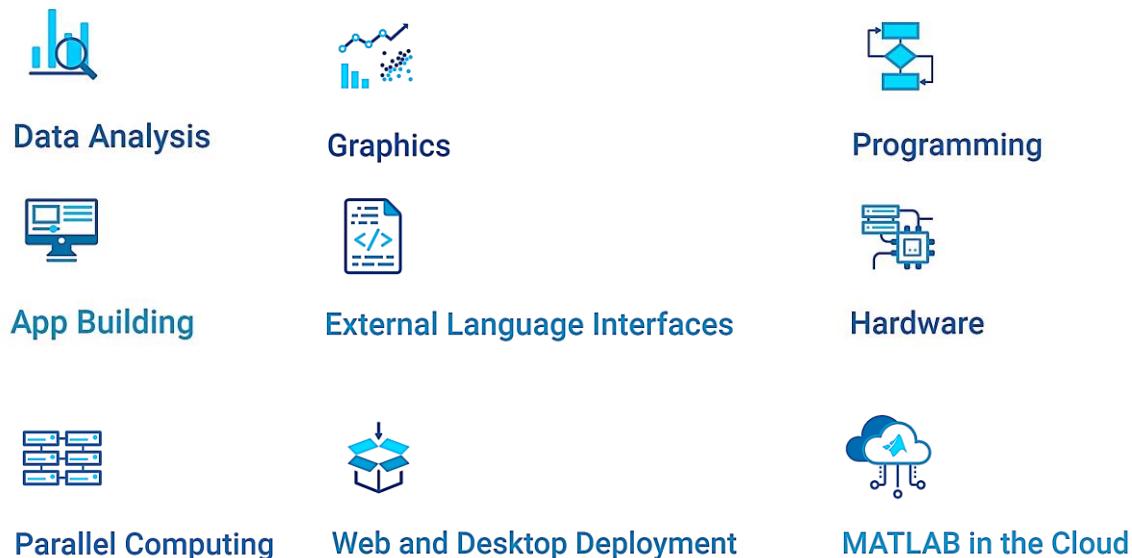
MathWorks



- **Low Code Data Analysis**
- **Demo – Flight Sensor Data**
 - ✓ Import → Clean → Model → Share
- **Learning Resources**

What is MATLAB?

- MATLAB is a programming and numeric computing platform
- Analyze data, develop algorithms, and create models
- Used by millions of engineers and scientists





- Millions of engineers and scientists worldwide use MATLAB and Simulink.



4 million+
users in 185 countries

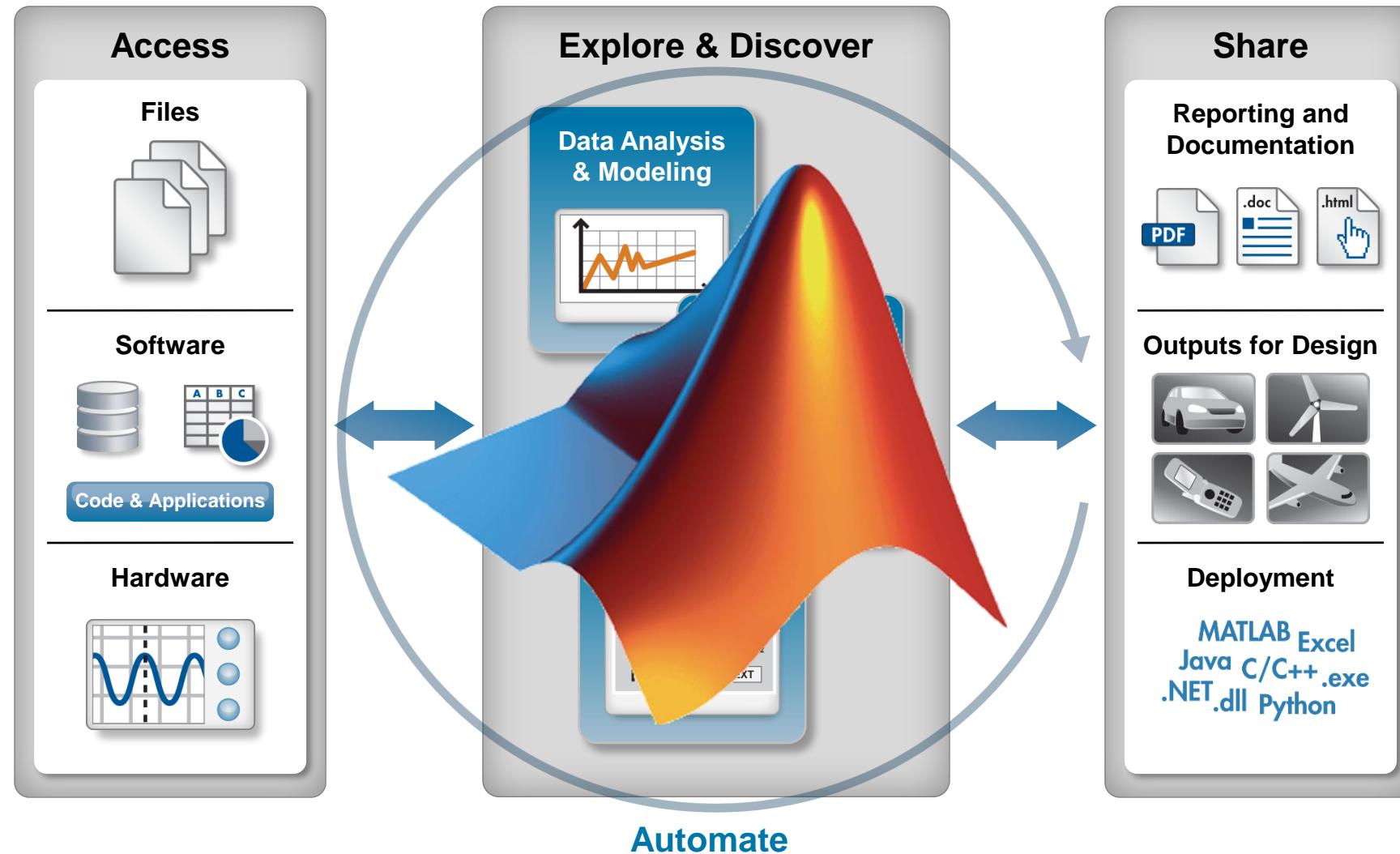


100,000+
businesses, governments,
and universities



All of the top 10
automotive and
aerospace companies

MATLAB simplifies the data analysis workflow with low code tools



What are “low code” tools?

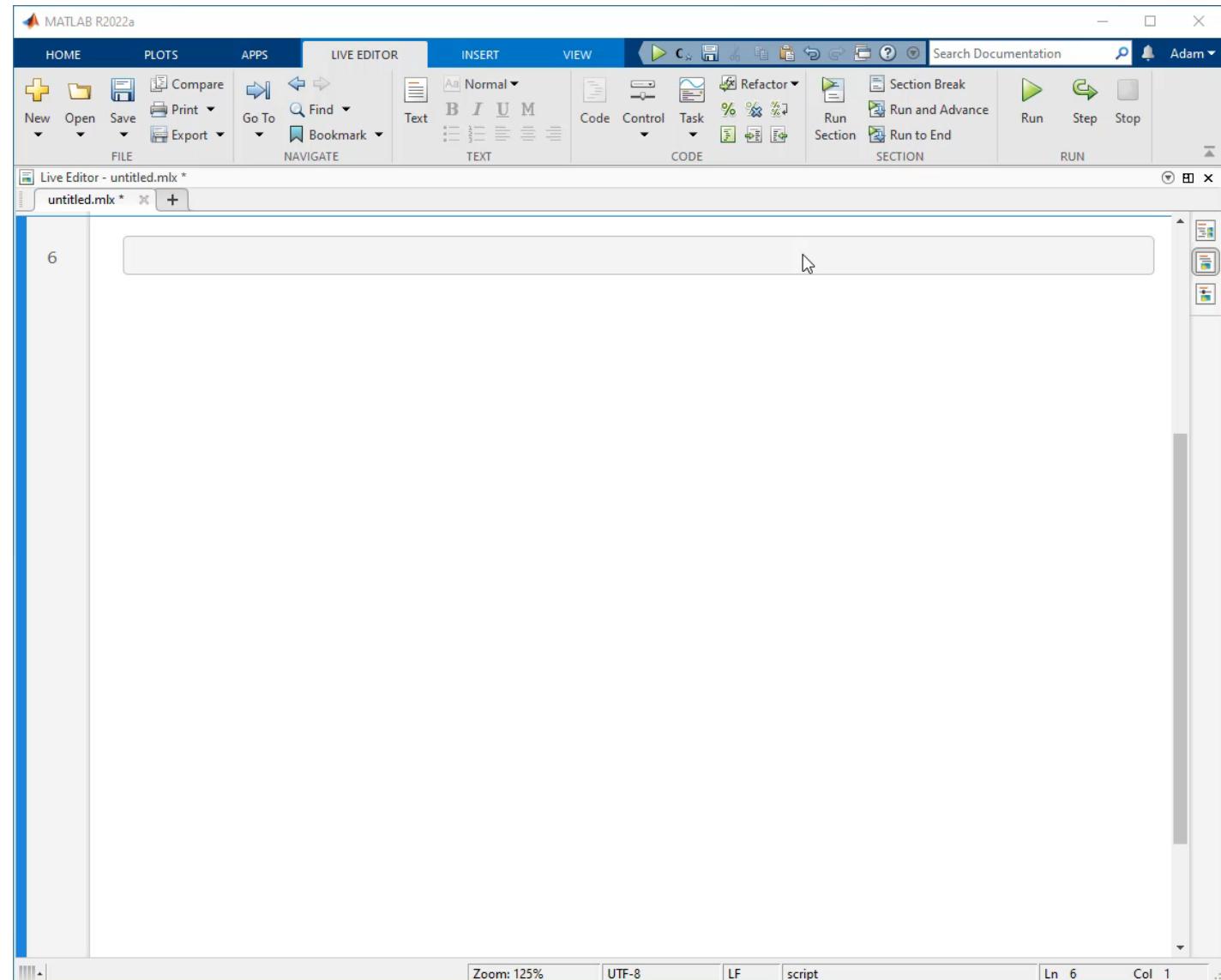
Low code tools enable:

- rapid software development
- minimal manual coding

Benefits of low code tools:

- Easier
- Teaches you *how* to code
- Solve task first, code later

Not just for beginners

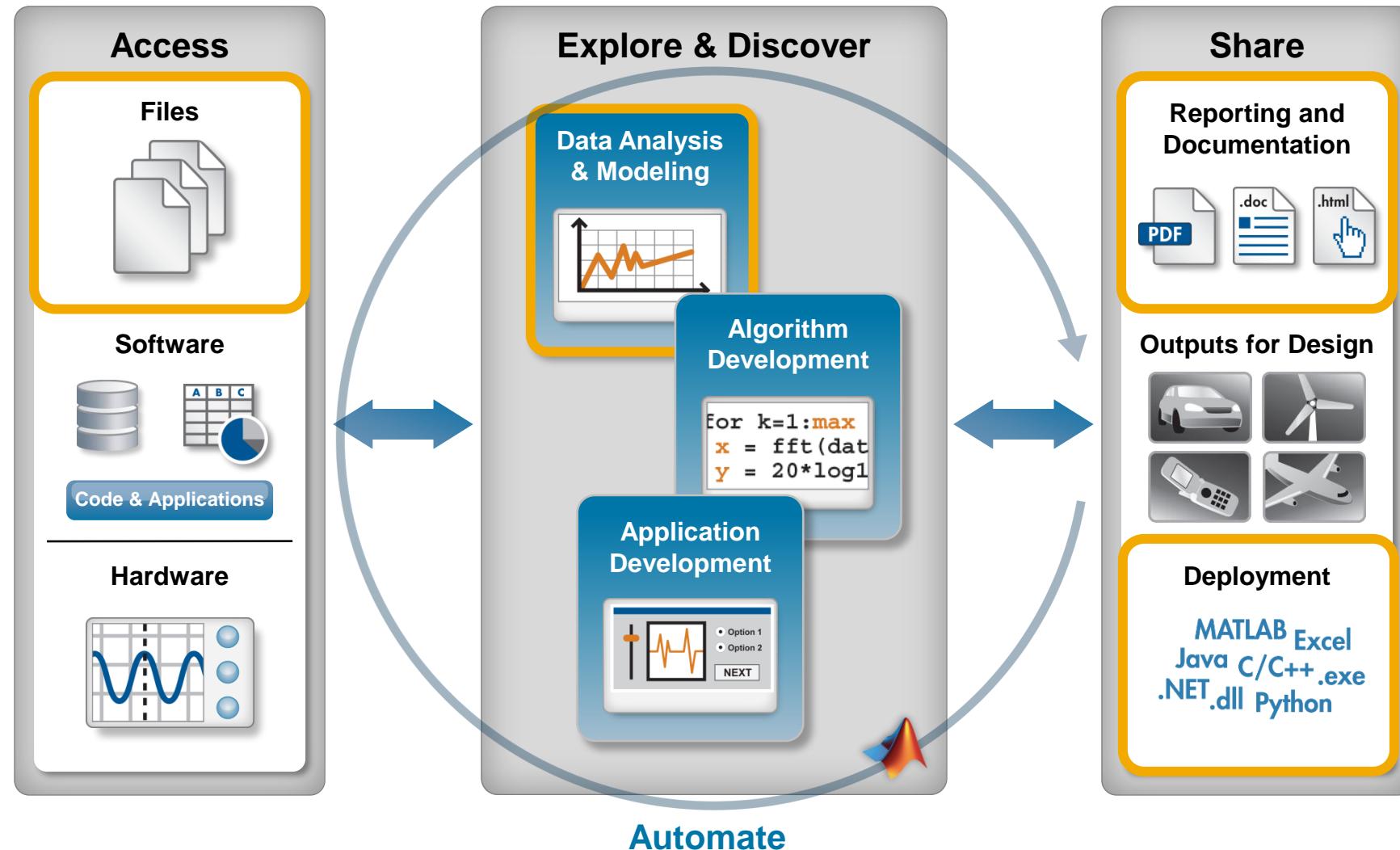


Case Study: Modeling Flight Sensor Data

- **Objective:**
 - Create a virtual sensor model for non-observable or costly-to-observe states (Air Speed)
- **Inputs:**
 - Excel file with 13 sensors from 1 flight
- **Approach:**
 - Visualize and explore data
 - Clean sensor anomalies
 - Train regression model to predict state
 - Share results in a [report](#)
- **Source:**
 - [NASA Dash Link: Sample Flight Data](#)



MATLAB simplifies the data analysis workflow with low code tools

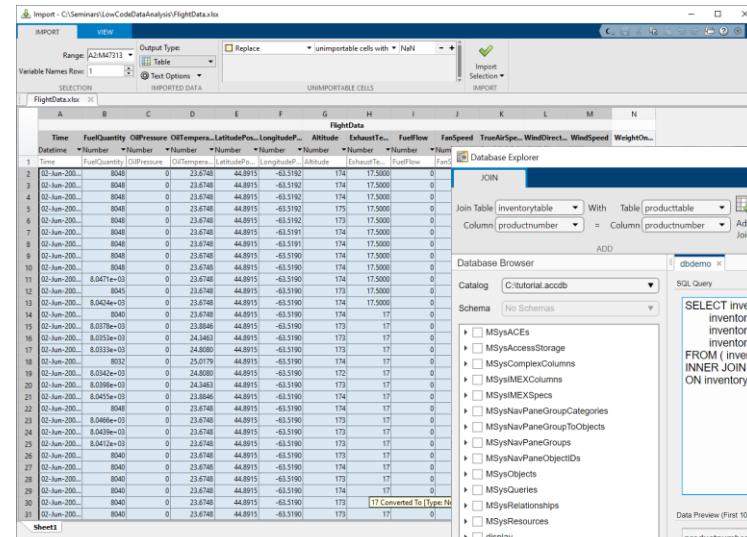


Use low code tools for easy access to files, databases, and hardware

Access

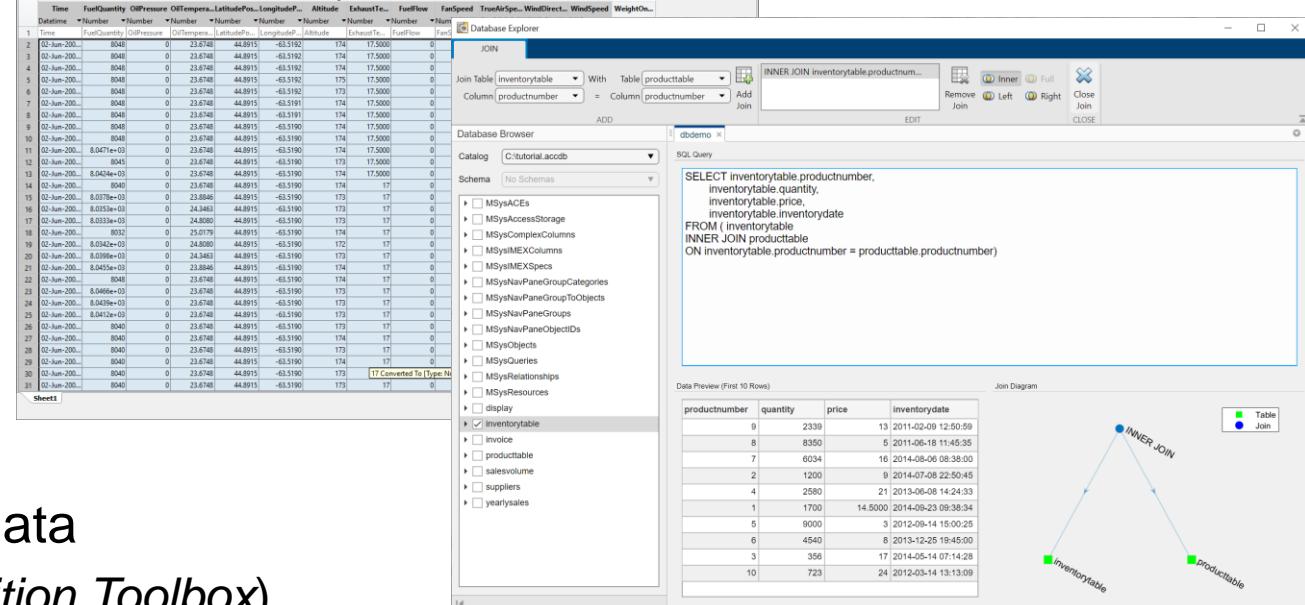
- Import Tool
 - Text, CSV, and Excel files

Explore & Discover

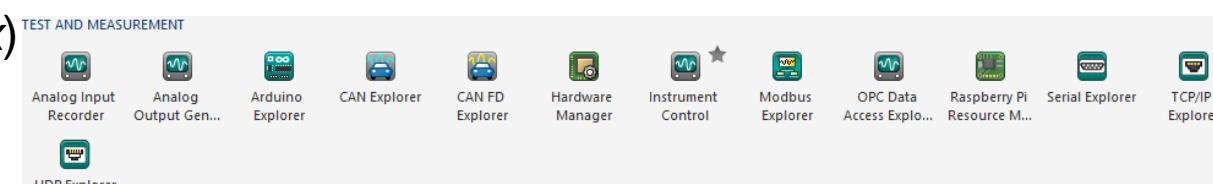


- Database Explorer (*Database Toolbox*)
 - ODBC & JDBC SQL Databases

Share



- Measurement hardware and industrial data
 - Data acquisition hardware (*Data Acquisition Toolbox*)
 - Stand-alone instruments and hardware (*Instrument Control Toolbox*)
 - OPC UA and Aveva PI Server, Modbus devices (*Industrial Communication Toolbox*)
 - CAN, J1939, and XCP (*Vehicle Network Toolbox*)



Access data in many formats from many locations

- Type of data
 - Observational
 - Timeseries
 - Image & video
 - N-D
- Location of data
 - SQL & NoSQL databases
 - HDFS
 - AWS S3
 - Azure Blob Storage



Over 100 low code tools for data analysis, engineering, and AI

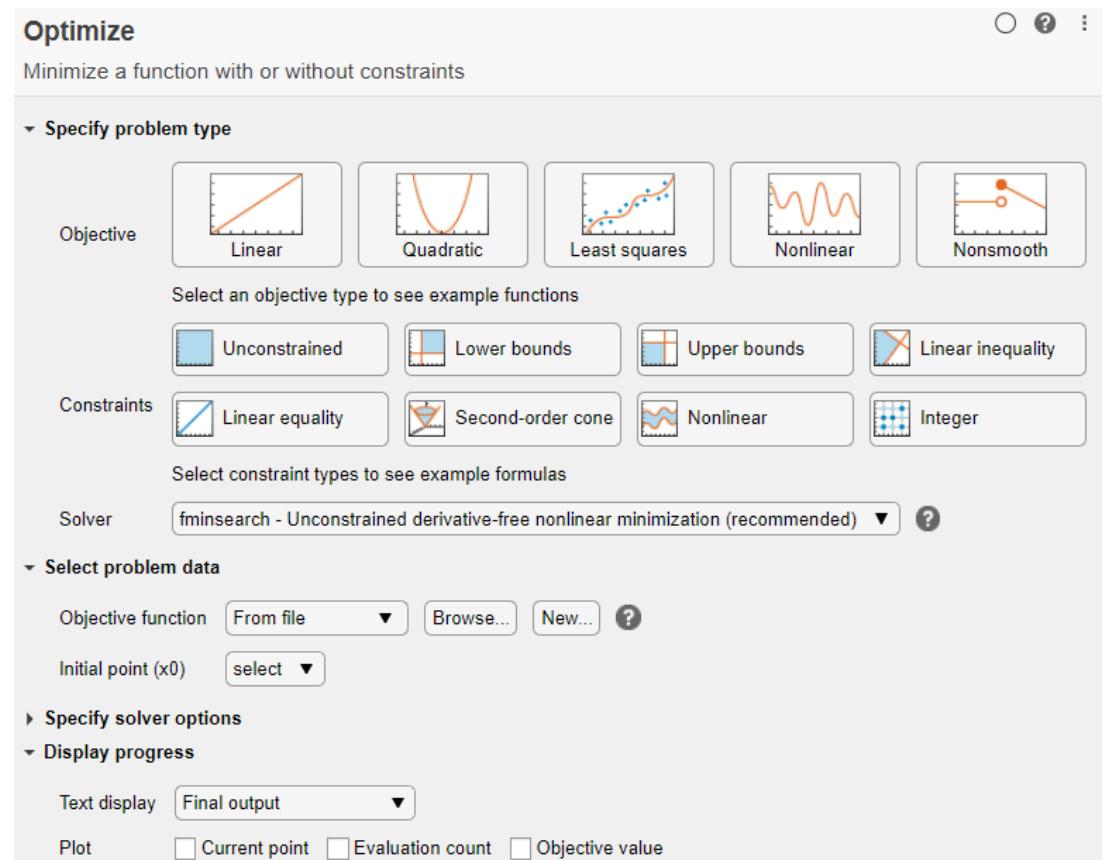
Access

Explore & Discover

Share

- **Data Analysis**

- Visualize, manipulate, and preprocess
- Math, statistics, and optimization

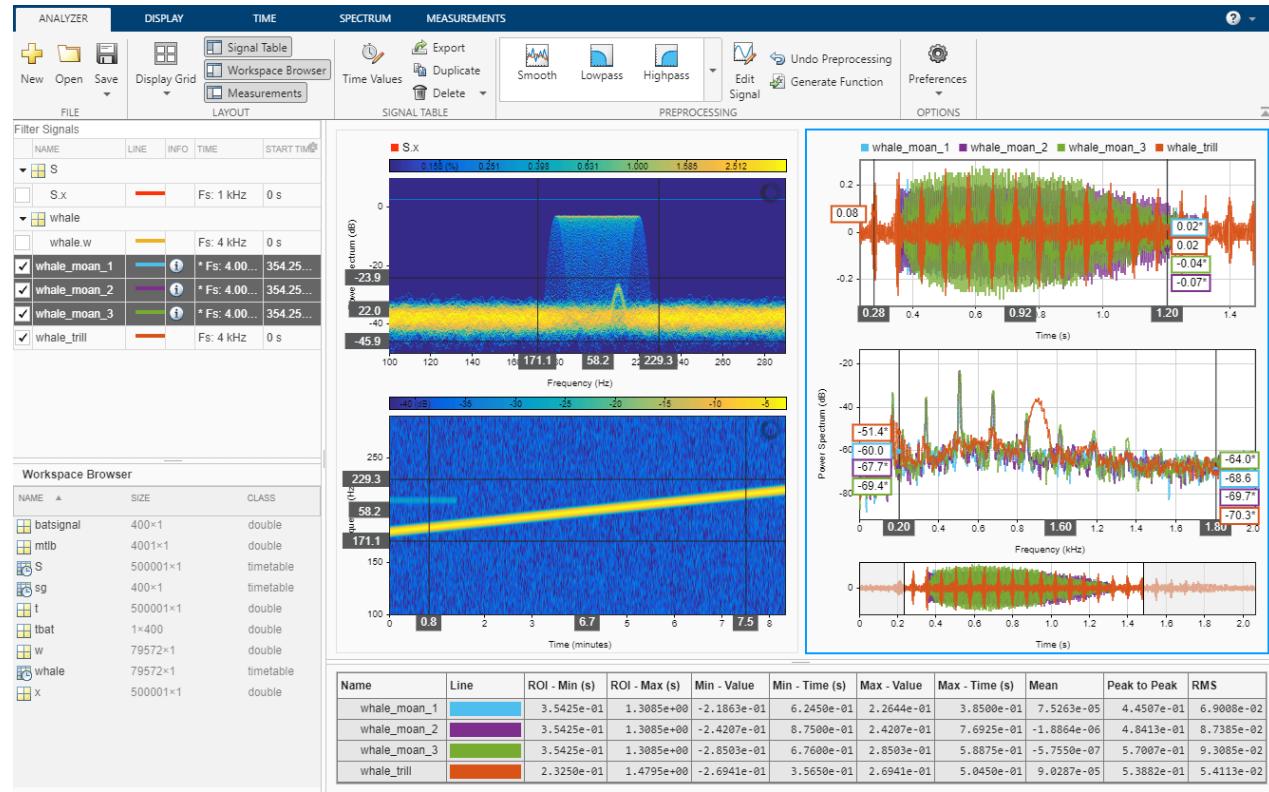


Over 100 low code tools for data analysis, engineering, and AI

Access

- **Data Analysis**
 - Visualize, manipulate, and preprocess
 - Math, statistics, and optimization
- **Engineering**
 - Control system design and analysis
 - Signal processing and communications
 - Image processing and computer vision

Explore & Discover



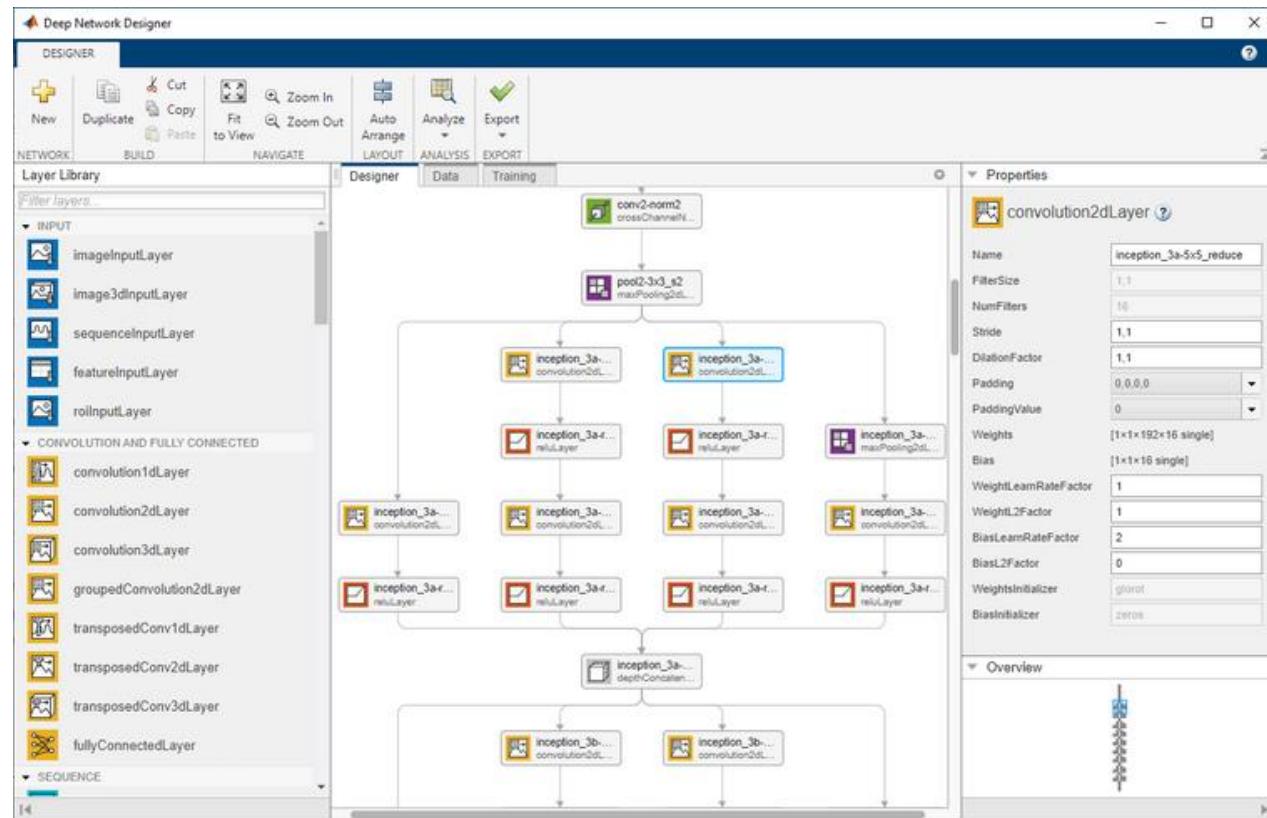
Share

Over 100 low code tools for data analysis, engineering, and AI

Access

- **Data Analysis**
 - Visualize, manipulate, and preprocess
 - Math, statistics, and optimization
 - **Engineering**
 - Control system design and analysis
 - Signal processing and communications
 - Image processing and computer vision
 - **Artificial Intelligence**
 - Ground truth labeling
 - Network design, training, and validation
 - Quantization and deployment

Explore & Discover



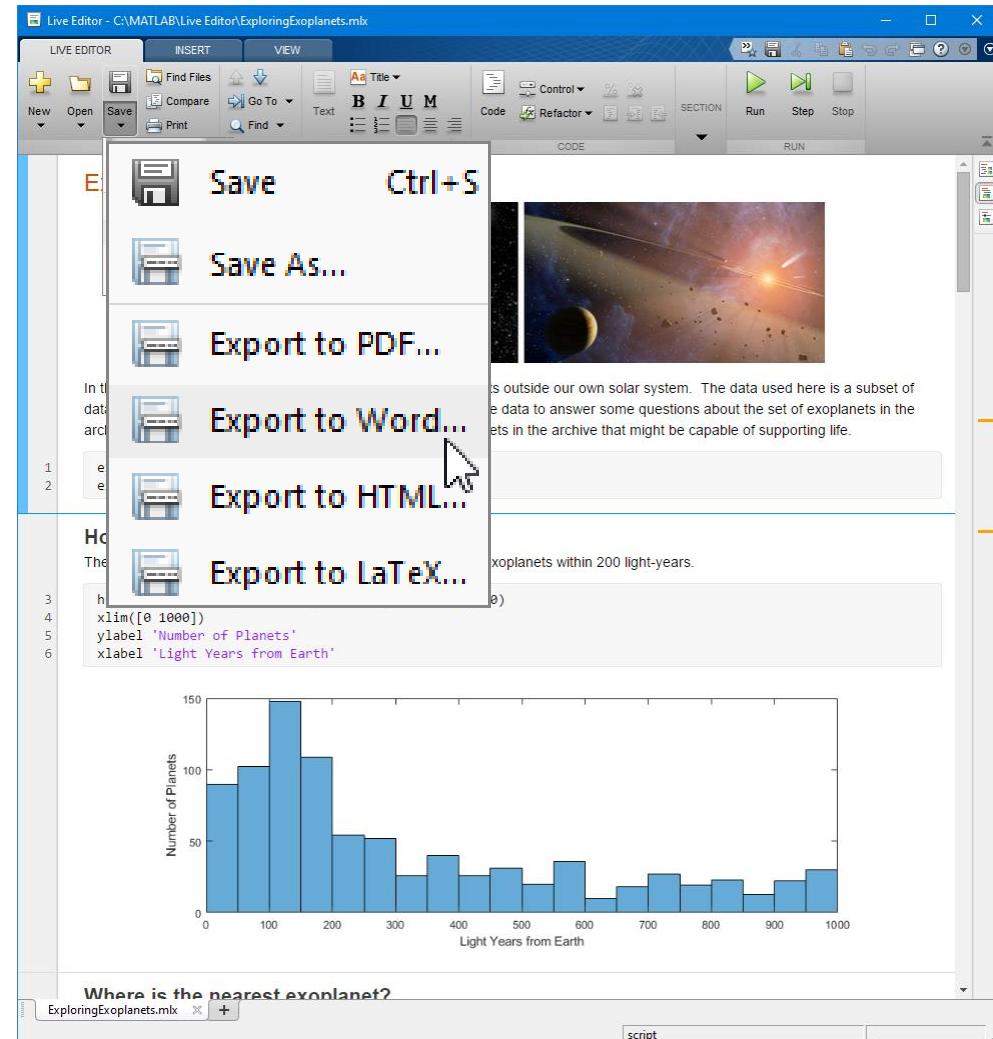
Share

Document as you go – *your script is your report*

Access

- Divide code into sections
- Embed outputs next to the code
- Add rich text formatting, equations, images, and hyperlinks
- Include animations with embedded controls, and export
- Programmatically control fonts
- Save directly to PDF, HTML, Word, and LaTeX

Explore & Discover



Share

As your needs grow, the MATLAB language grows with you.

- Start simple
- Create scripts
- Write reusable functions
- Author robust applications

```
classdef movingBlip < blip
    %MOVINGBLIP Summary of this class goes
    %    Detailed explanation goes here

    % Copyright The MathWorks, Inc. 2008,
    % Author: MathWorks

    properties
        deltaAoA
    end

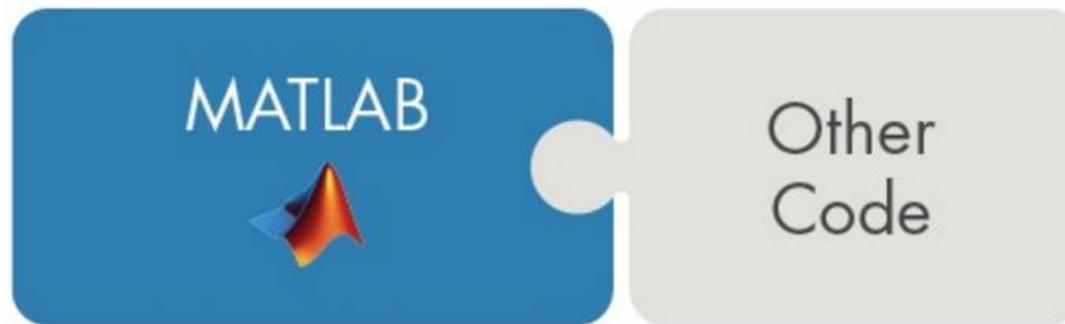
    methods
        function obj = movingBlip(deltaAoA)
            % assign the superclass portion
            obj = obj@blip(varargin{:}) ;

            if nargin >= 1
                % assign the movingBlip's
                obj.deltaAoA = deltaAoA ;
            end
    end
```

Grow from coding by yourself to coding in a team

- Projects
- Source control
- Testing & CI
- External interfaces

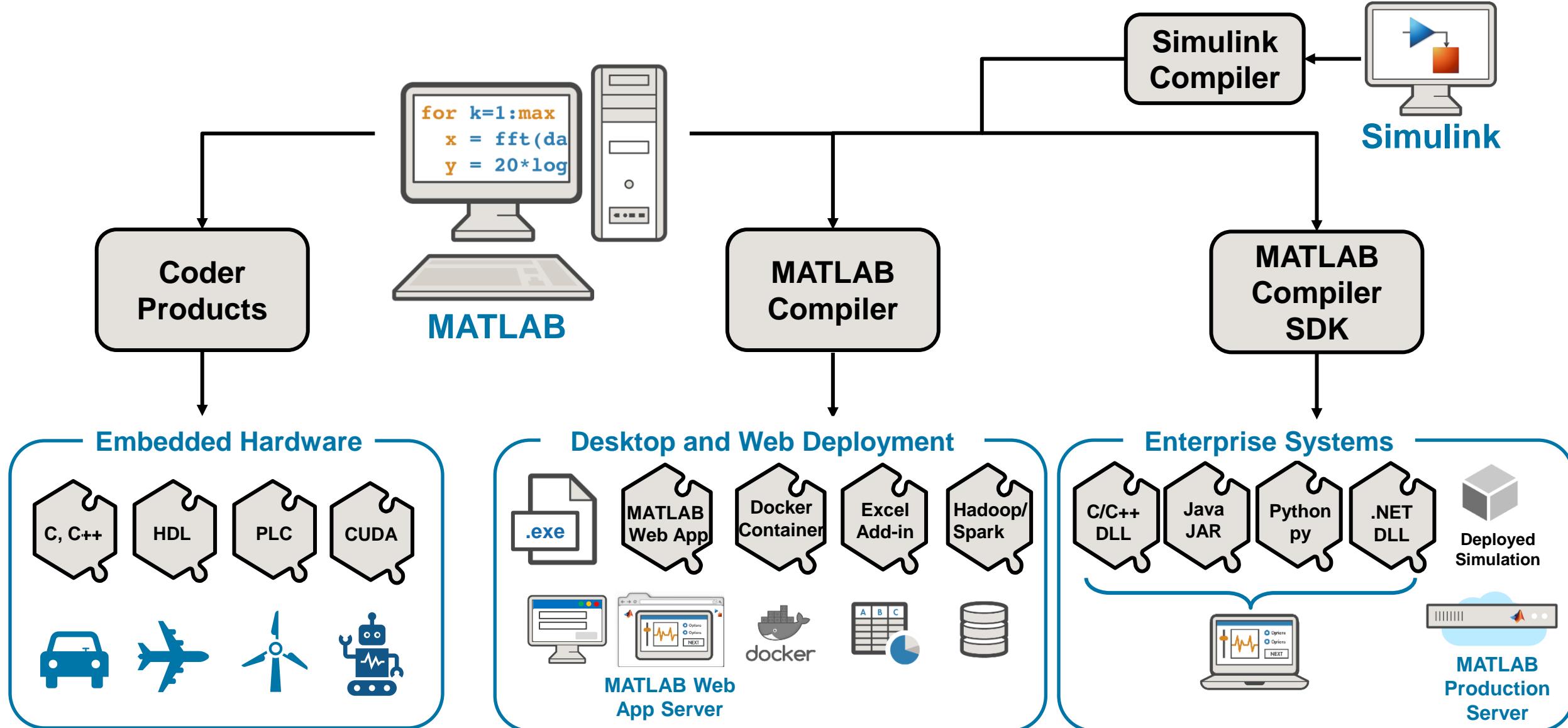
Call Libraries Written in Another Language



Call MATLAB from Another Language



Deploy your applications to non-MATLAB users



Agenda

- Low Code Data Analysis
- Demo – Modeling Flight Sensor Data
- Learning Resources

How can I get started?



tinyurl.com/yrctym2f

Technology



August 16, 2024

Campus wide access to MATLAB available now

Wichita State now offers a Campus-Wide License that provides unlimited use of MATLAB, Simulink and over 100 additional toolboxes to all students, faculty, staff and researchers, on and off campus, on any device.

Users will have access to the software and associated documentation as well as immediate access to new releases. The Campus-Wide License permits the installation of MATLAB and Simulink on campus-managed and user-owned computers. **Note: For lab and classroom installation, submit a ticket to [Desktop Support - Help Me Set up.](#)**

For additional information including how to access MATLAB and associated software, [visit the MATLAB webpage.](#)

See Also

This news item is in these publications:

- [Shocker Blast: Monday, Aug. 26, 2024](#)
- [WSU Today: Monday, Aug. 26, 2024](#)
- [Shocker Blast: Wednesday, Aug. 21, 2024](#)
- [WSU Today: Monday, Aug. 19, 2024](#)

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Every month, over **2 million** MATLAB & Simulink users visit MATLAB Central to get questions answered, download code and improve programming skills.

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Central

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MATLAB Answers: Q&A forum; most questions get answered in only **60 minutes**

File Exchange: Download code from a huge repository of free code including **tens of thousands** of open source community files

Cody: Sharpen programming skills while having fun

Blogs: Get the inside view from Engineers who build and support MATLAB & Simulink

ThingSpeak: Explore IoT Data

And more for you to explore...

MATLAB **EXPO**

November 13–14, 2024 | Online

Register at matlabexpo.com/online



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