

# What's new in MATLAB for teaching

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Our goal is to make MATLAB the easiest and most productive environment for engineers and scientists.

We've released over 7,000 new features and enhancements in just the last 2 years.

# See all the details in the Release Notes

- Filter results by:
  - Release range
  - Category
  - Text filter
  - Incompatibilities
  - Highlights

## MATLAB Release Notes

R2024b

[Bug Reports](#) | [Bug Fixes](#)

[expand all in page](#)

YOUR SELECTIONS Performance x

Found 104 notes Release Range: R2021b to R2024b [Share](#)

R2021b to R2024b Performance  Incompatibilities  Highlights Sort Release: Latest to Earliest

Text Filter: MATLAB Release M

▼ R2024b  
New Features, Bug Fixes, Comp...

R2024b: [Bug Fixes](#) [expand all](#)

**Performance**

▼ [datetime](#) Format Parsing: In...

[datetime](#) format parsing p...  
which are part of ongoing e...

...formats that include localized names or time zone offsets

...ing common formats that include localized names or time zone offsets. This list shows a few examples of such formats, performance:

- dd-*MMM*-uuuu HH:mm:ss
- MMMM/dd/uuuu
- QQQ-uuuu
- uuuu-MM-dd HH:mm:ss Z
- uuuu-MM-dd HH:mm:ss.SSS xxx

For example, this code creates a string array of dates that use a localized abbreviation for the month of April. The dates in the string array use the `dd-MMM-uuuu HH:mm:ss` format, where the *MMM* specifier represents the abbreviated month name. Then the code uses the `datetime` function to parse and convert the string array. The code is **about 17x faster** than in the previous release.

```
function timingTest
s = "23-Apr-2024 11:30:" + randi([10,59],10000,1);
for i = 1:100
    d = datetime(s, ...
        InputFormat="dd-MMM-uuuu HH:mm:ss", ...
        Locale="en_US");
end
end
```

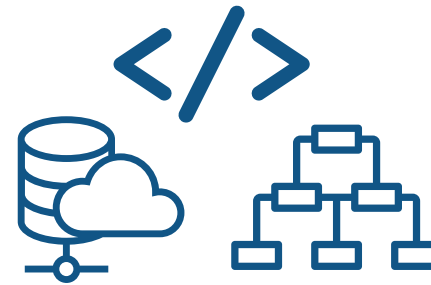
# Four themes for today



**Access**



**Ease of Use**



**Software Workflows**



**Integrations**

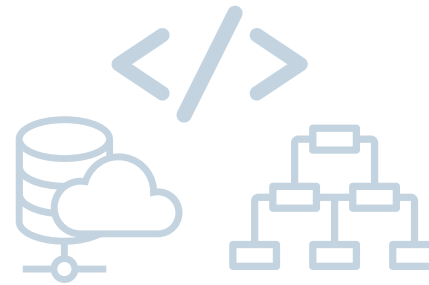
# Theme - Access



**Access**



Ease of Use



Software Workflows



Integrations

# Native support for Apple Silicon

- Run MATLAB natively on M series chips
  - Faster startup time
  - Faster linear algebra
  - Reduced battery usage
  - Reduced memory usage

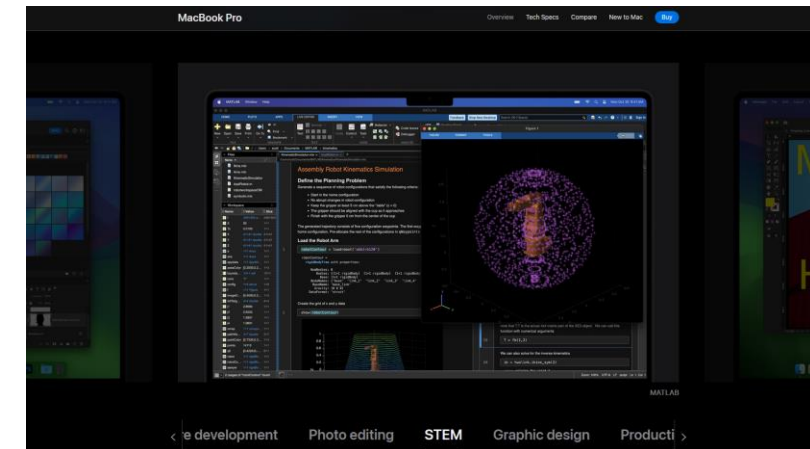
[Apple Release Event](#) – Oct 2023



[MacBook Pro promo video](#)



[MacBook Pro home page](#)



# A New Desktop for MATLAB is in open beta

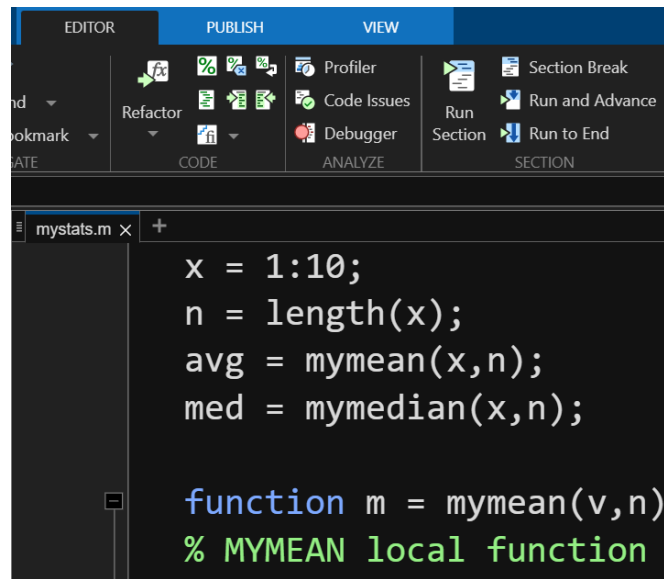
- Find on [File Exchange](#) or Add-Ons menu
- Previews of upcoming features
- Integrated feedback for functionality requests, performance issues, and bugs

The diagram illustrates the user journey to the new MATLAB desktop. It begins with a screenshot of the **File Exchange** website, where a post titled **New Desktop for MATLAB (Beta)** is visible. A blue arrow points from this post to a **Try the New Desktop** button located on the MATLAB interface. A second blue arrow points from this button to a full screenshot of the MATLAB R2024b desktop environment, showing the **HOME**, **PLOTS**, **APPS**, **LIVE EDITOR**, **INSERT**, and **VIEW** tabs, along with various toolbars and a workspace window.

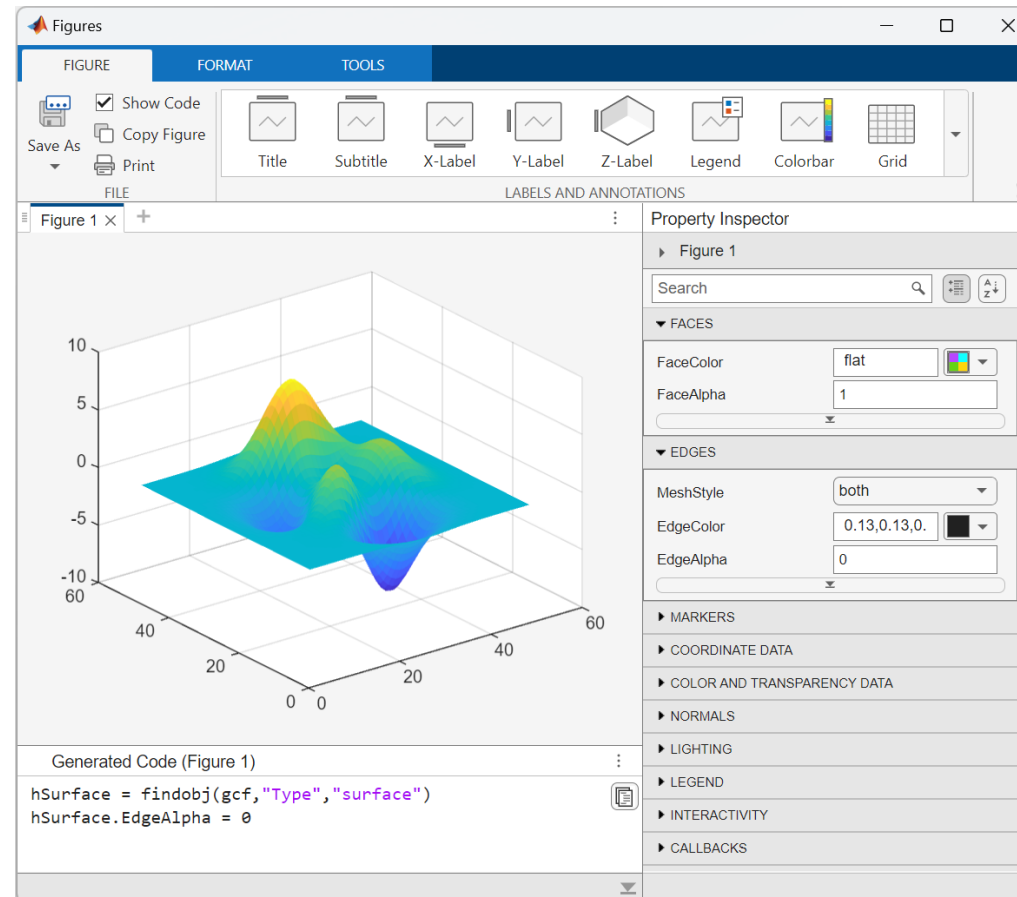
# New Desktop unlocks enhanced productivity features

Already available in MATLAB Online

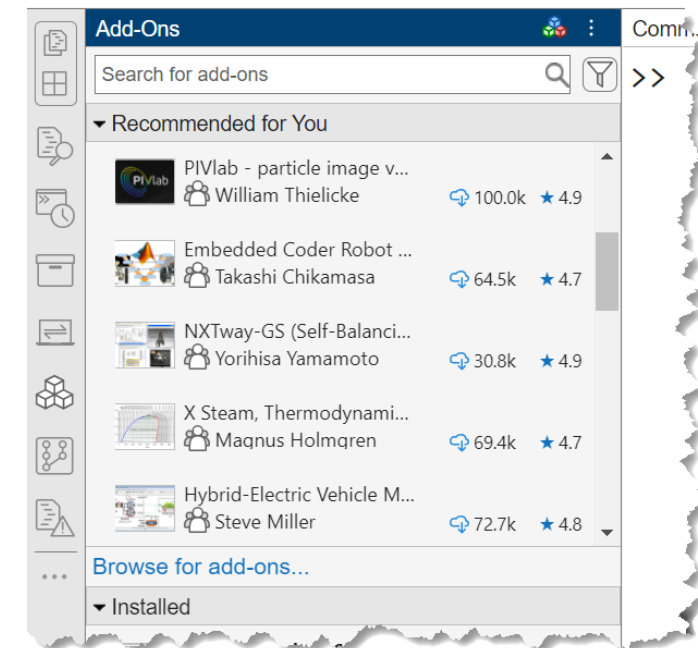
## Dark Mode



## Enhanced Figure Window



## New Side Panels



- Source control
- Debugging
- Add-On management
- Many **more**





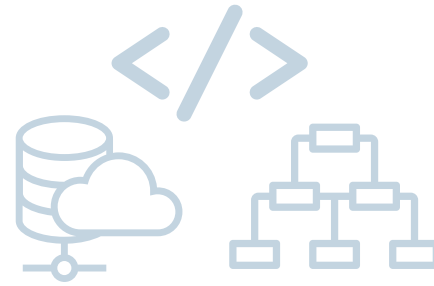
# Theme - Ease of Use



Access



**Ease of Use**



Software Workflows



Integrations

# Create interactive, human readable scripts in the Live Editor

- Make scripts readable
  - Richly formatted text
  - Interleave code & output
  
- Add interactivity
  - Hyperlinks and table of contents
  - Live Controls to adjust parameters
  
- Share with non-MATLAB users
  - Export as report (pdf, docx, etc.)
  - Share through GitHub and MATLAB Online

SunriseSunset.mlx × +

## Estimating Sunrise and Sunset

We can estimate sunrise and sunset times if we know the latitude, longitude, and UTC offset. The [solar declination](#) ( $\delta$ ) is the angle of the sun relative to the earth's equatorial plane. On any given day of the year ( $d$ ), using the latitude ( $\phi$ ), the sun's declination ( $\delta$ ) and the solar time correction ( $SC$ ) we can calculate sunrise and sunset times.

Solar Declination	Sunrise	Sunset
$\delta = \sin^{-1} \left[ \sin(23.45) \sin \left( \frac{360}{365} (d - 81) \right) \right]$	$12 - \frac{\cos^{-1}(-\tan \phi \tan \delta)}{15^\circ} - \frac{SC}{60}$	$12 + \frac{\cos^{-1}(-\tan \phi \tan \delta)}{15^\circ} - \frac{SC}{60}$

**Table of Contents**

[Estimating the Sunrise and Sunset Times](#)  
[Plot Yearly Results](#)

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## Estimating the Sunrise and Sunset Times

Set the latitude, longitude, and UT offset.

```
1 lat = 42  ;
2 lon = -71  ;
3 UTCoff =  ;
```

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

```
4 day = 1:365;
5 timeCorr = equationOfTime(day)

timeCorr = 1×365
   -3.7052   -4.1497   -4.5894   -5.0239   -5.4528   -5.8756   -6.2921   -6.7018 ...
```

```
6 plotSunriseSunset(lon, UTCoff, timeCorr, day, lat)
```

Sunrise and Sunset

10

# Interactively solve tasks and workflows

- Live Tasks solve steps within the Live Editor
- Apps solve larger, multi-step workflows
- Generate the code for your solution
- 40+ Live Tasks and 120+ Apps
- Build and share custom Tasks and Apps

The screenshot displays the MathWorks Live Editor interface. At the top, there are tabs for APPS, LIVE EDITOR, INSERT, and VIEW. Below these are several categories of apps:

- FAVORITES:** Curve Fitter, Optimization, PID Tuner, System Identification, Wireless Waveform G..., Signal Analyzer, Instrument Control, SimBiology Model Builder, SimBiology Model Analy..., MATLAB Coder, Application Compiler.
- MATLAB:** Class Diagram Viewer, Code Analyzer, Code Compatibilit..., Data Cleaner, Dependency Analyzer, Experiment Manager, Hardware Manager, Profiler, Test Browser.
- MACHINE LEARNING AND DEEP LEARNING:** Classification Learner, Deep Network Designer, Deep Network Quantizer, Neural Net Clustering, Neural Net Fitting, Neural Net Pattern Rec..., Neural Net Time Series, Regression Learner, Reinforcement Learning De...
- MATH, STATISTICS AND OPTIMIZATION:** Timetable, Variables, Timetables, Variables.

The Experiment Manager window is open, showing an "Exhaustive Sweep Result" for a "LotkaVolterraExperiment". The experiment details include:

- Start: 8/2/2024, 1:38:53 PM
- 9/9 Trials
- Complete: 9
- Running: 0
- Discarded: 0
- Stopped: 0
- Queued: 0
- Error: 0
- Cancelled: 0

The experiment details table is as follows:

Trial	Status	Actions	Elapsed Time	Alpha	Beta	RabbitsInitial	FoxesInitial	RabbitsMin	RabbitsMax	FoxesMin
1	Complete		0 hr 0 min 18 sec	150.0000	250.0000	400.0000	100.0000	122.6264	445.0740	7
2	Complete		0 hr 0 min 15 sec	200.0000	250.0000	400.0000	100.0000	99.7330	507.8026	7
3	Complete		0 hr 0 min 19 sec	250.0000	250.0000	400.0000	100.0000	84.9422	564.5798	8
4	Complete		0 hr 0 min 12 sec	150.0000	300.0000	400.0000	100.0000	176.9674	470.1470	8
5	Complete		0 hr 0 min 22 sec	200.0000	300.0000	400.0000	100.0000	138.8858	557.0936	9
6	Complete		0 hr 0 min 19 sec	250.0000	300.0000	400.0000	100.0000	110.9909	631.7341	9

Below the table, there are visualizations. The first is a "Population v. Time" plot showing the population of Rabbits (blue line) and Foxes (orange line) over time (0 to 20 hours). The Rabbits population oscillates between approximately 100 and 500, while the Foxes population oscillates between approximately 50 and 250.

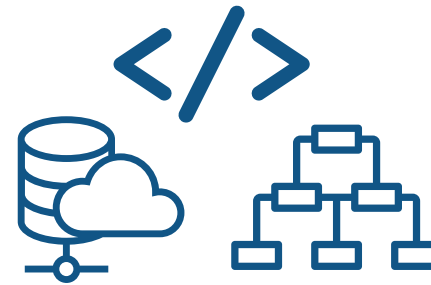
# Theme - Software Workflows



Access



Ease of Use



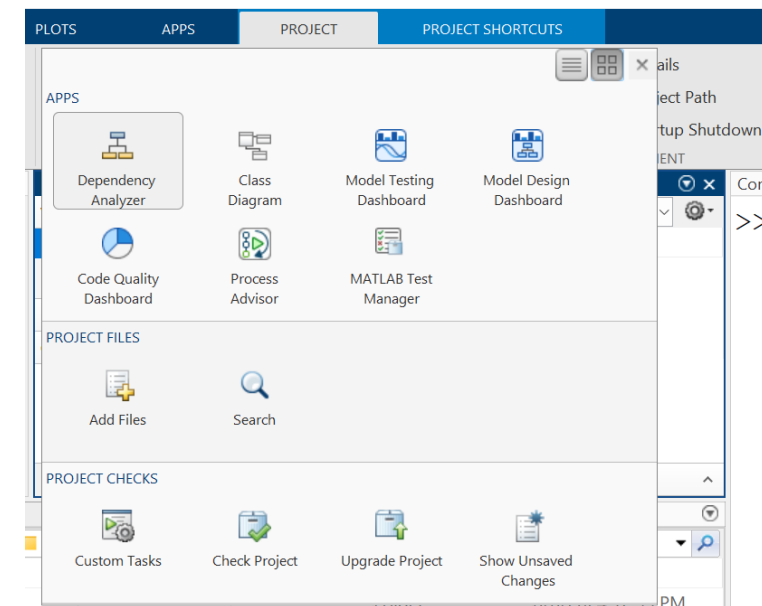
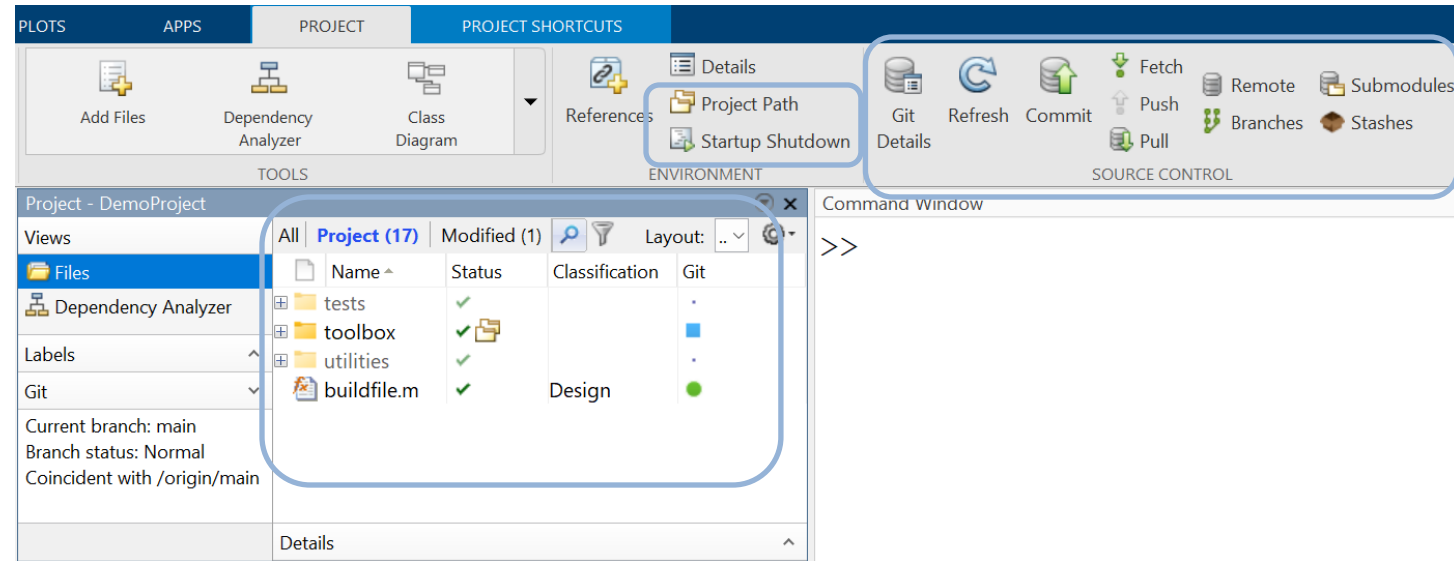
**Software Workflows**



Integrations

# Create reproducible environments with Projects

- Start from the same place every time
  - Tracks all relevant files
  - Set path on opening and restore on closing
  - Automatically execute startup and shutdown activities
- Simplify common workflows
  - Source control integration
  - Code refactoring across project files
- Advanced features
  - Reference projects reuse existing projects
  - Apps to analyze file dependencies
  - File labeling for searching and grouping
  - Project API for scripting actions in projects
  - ...



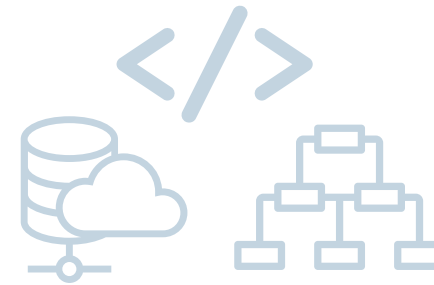
# Theme - Integrations



Access



Ease of Use



Software Workflows

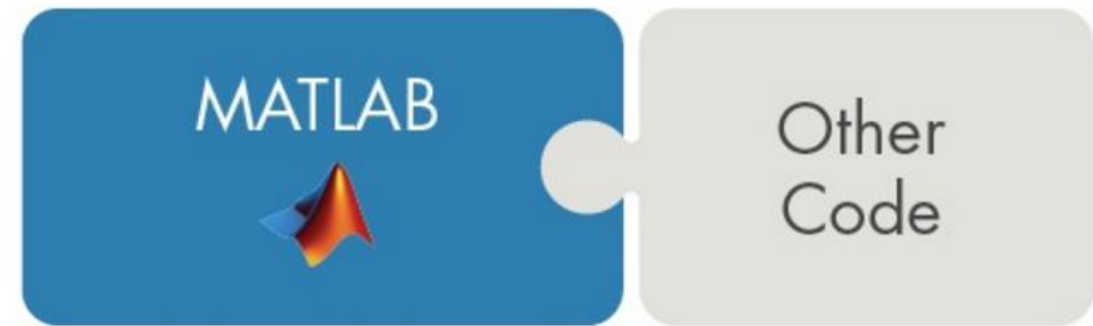


**Integrations**

# Collaborate and integrate using seven bidirectional interfaces

- Co-execute MATLAB with other languages and applications
- Bidirectional interfaces for:
  - Python
  - Java
  - C/C++
  - .NET
  - REST **R2024a**
  - COM
  - Fortran

Call code and libraries written in another language from MATLAB



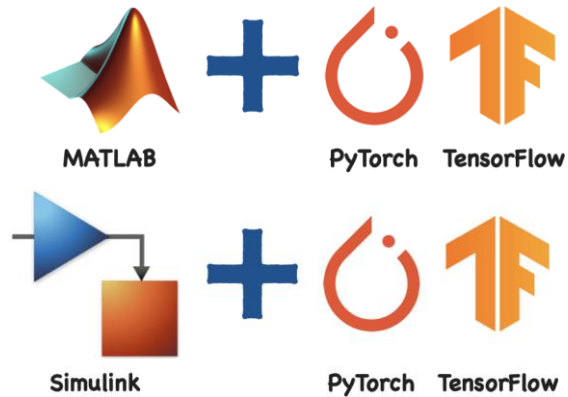
Call MATLAB code from another language



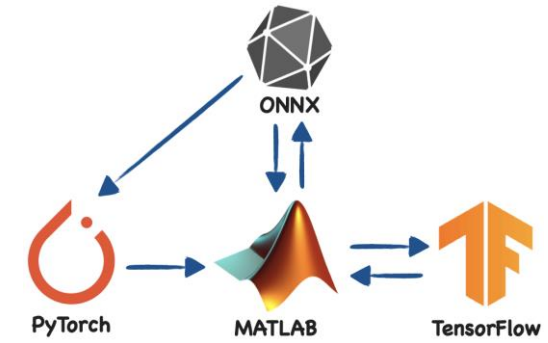
# Common use case: combine MATLAB with python for AI

Techniques:

## Co-execute

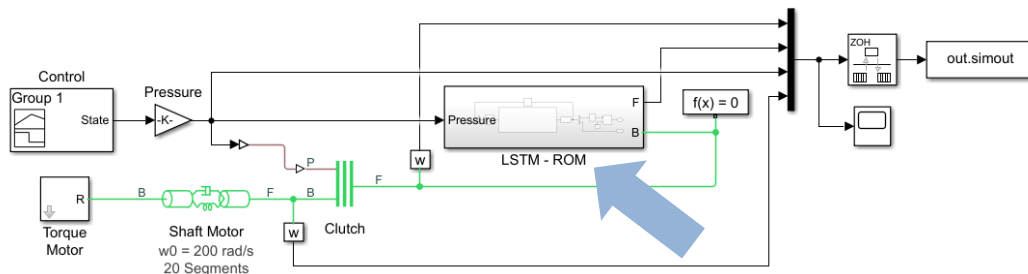


## Exchange Models

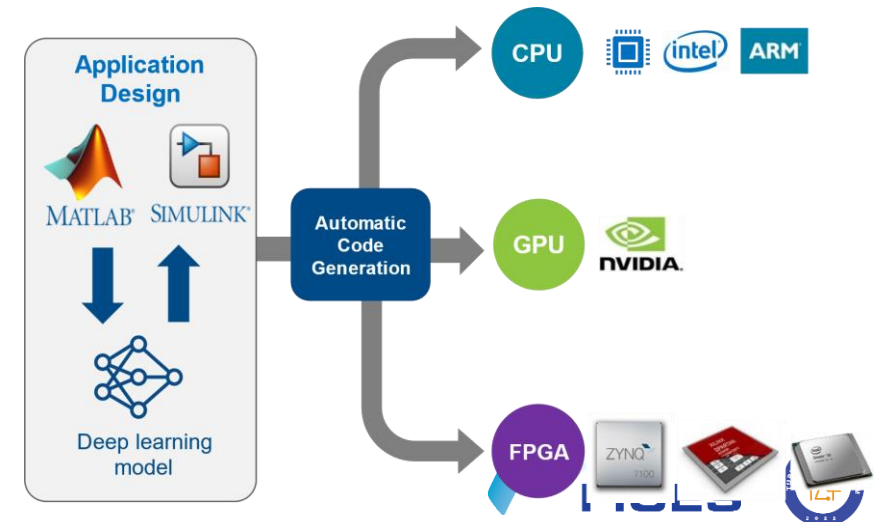


## Engineering + AI

Applications:



## Deploy to Embedded Processors





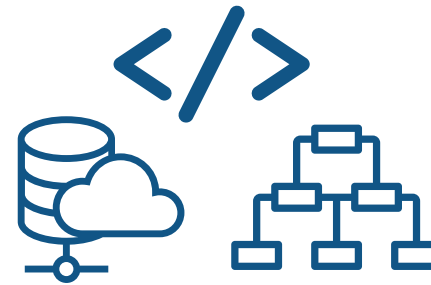
# Where should you go next?



**Access**



**Ease of Use**



**Software Workflows**



**Integrations**

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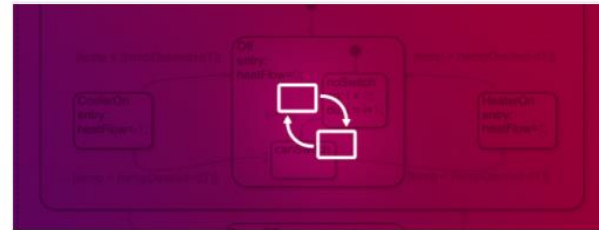
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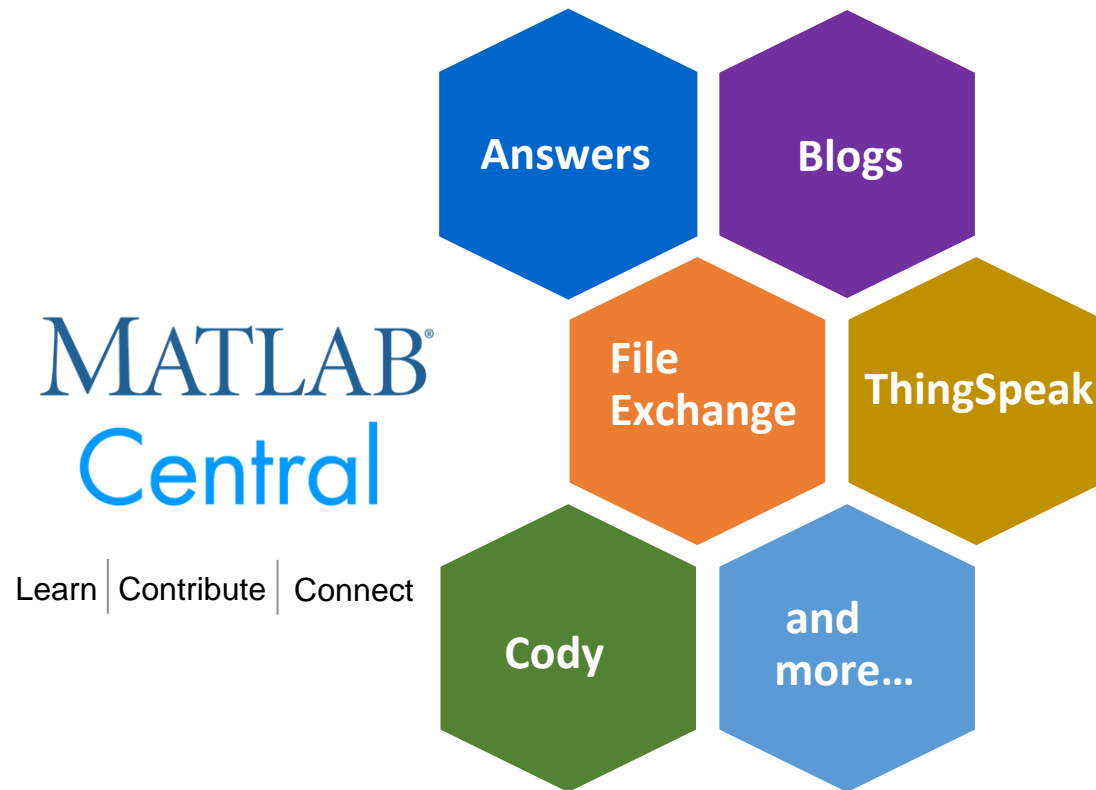
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[Details and launch](#)

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And more for you to explore...

Thank you

Q&A – 5min

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