MATLAB EXPO 2019

Building and Sharing Desktop and Web Apps

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Your Friendly Neighborhood Robo Advisor

Our Algorithms.

Your Money.

Low Fees.

Financial Planning and Investing Automated.
Agenda

- Motivation
- Building apps using App Designer
- Sharing
  - Standalone Apps
  - Web Apps
Why do we need UIs?

**Write commands in a text based environment**

**Work in an “user-friendly” application**

**Easier User Interaction**

**Increased Usability**
Simple, modular app architecture

- Data
  - Effectively and understandably organize your data
  - Robust to changes
  - Enable your algorithms

- Algorithm
  - Well documented
  - Modularized components for reuse
  - Allow for easily traceable data modifications

- App
  - Should DRIVE your algorithms, not BE your algorithms
Layers of an application

Your Challenge

MATLAB Algorithm

UI
Three good reasons to develop MATLAB Apps

1) Make your application **Usable** and **Accessible** in and outside your company via desktop and web

2) Write your code and your apps in a **Single Environment** (you do not need to know any additional language).

3) Using App Designer, you can easily develop your UI in a **Graphic Interactive Environment**
A2A Develops Comprehensive Risk Management Solution for Energy Markets

Challenge
Manage and mitigate risk across markets in a large utility company

Solution
Use MATLAB and companion toolboxes to process data, develop risk and pricing models, and deploy an interactive dashboard for analysts

Results
- Hour-long calculations completed in 30 seconds
- Development time halved
- Pricing model development accelerated

“Using Java™ or another lower-level language we estimate that it would have taken twice as long in our current operation environment.”

Simone Visonà
A2A

A2A’s GUI for calibrating and forecasting electricity spot price, a component of the Risk Management Dashboard.
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▪ Sharing
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App Designer

- Intuitive Design environment
- Comprehensive UI component set
- Improved code and coding tools
- Run and author App Designer apps in a web browser
- Package apps using MATLAB Compiler and host them using MATLAB Web App Server
- GUIDE to App Designer migration tool (File Exchange)
Building an app using App Designer - Workflow
App Testing Framework
Write automated tests for App Designer apps

- Verify app behavior with tests that programmatically perform gestures on a UI component

```matlab
testCase.press(myApp.checkbox)

testCase.choose(myApp.discreteKnob, "Medium")

testCase.drag(myApp.continuousKnob, 10, 90)

testCase.type(myApp.editfield, myTextVar)
```
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App is built – What next?
Users of an application

Developers of the application

Deploy the UI as a MATLAB App in MATLAB

Use the UI without MATLAB

MATLAB Compiler

MATLAB Application

MATLAB Web App Compiler

.exe

.ctf

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Packaging and Deploying Apps

- **App Packaging**
  - Automatically includes all necessary files
  - Documents required products
  - Creates single installation file for easy distribution and installation into the MATLAB apps gallery

- **App Deployment using MATLAB Compiler**
  - Standalone executable
    - No MATLAB license required to run deployed app
    - Royalty-free distribution
  - Web App
    - Allow users to run App Designer Apps from a browser
Web App Workflow

- Install MATLAB Web App Server
- Configure MATLAB Web App Server
- Run `webAppCompiler` at the MATLAB command line to get .CTF file
- Navigate to `for_redistribution` folder & copy `webAppArchiveName.ctf` to app folder
- Go to `http://webAppServer:PortNumber/webapps/home/index.html` where `webAppServer` is your web app server URL, and `PortNumber` is the port specified when configuring the server.
Model-View-Controller app architecture

- Model-View-Controller architecture
  - The user interacts with the controller
  - The user sees the view
  - The model translates the controller input to update the view

- This architecture allows you to incrementally adjust, update, or replace components of the app in a safe and maintainable way
Ruukki Metals Improves Steel Manufacturing Processes with Standalone and Web-Based MATLAB Applications

Challenge
Enable operators to correctly set up steel coil processing lines in the manufacturing plant.

Solution
Build applications in MATLAB that enables operators to select and apply the proper settings, analyze production metrics from multiple databases, track individual coils, and refine the process.

Results
- Off-gauge coil length reduced from several meters to less than 50 centimeters
- Process efficiency increased
- Waste reduced

“Since deploying this application and the standalone executable that we created with MATLAB and MATLAB Compiler, we have seen fewer misalignments, less scrap, and significant increases in efficiency and consistency at the plant.”

Mika Judin
Ruukki Metals

Link to article

Ruukki’s web-based MATLAB application.
Use in Academia for Conceptual Understanding
Key Takeaways

- App Designer workflow
- Share apps via MATLAB Compiler and MATLAB Web App Compiler
Call to Action

- **App Designer**

- **Web Apps**

- **GUIDE to App Designer Migration Tool**
Training: Building Interactive Applications in MATLAB

This one-day course demonstrates how to create an interactive user interface for your applications (apps) in MATLAB®. Attendees will learn about user interface controls, such as push buttons, sliders, and menus, and how to use them to create a robust and user-friendly interface for your MATLAB app. Topics include:

- Laying out apps in the App Designer environment
- Creating callback functions for interactive components
- Creating and updating graphical objects in apps
- Making app components responsive to user behavior
- Creating apps with multiple windows
Please provide feedback for this block of sessions

- Scan this QR Code or log onto link below (link also sent to your phone and email)
- Enter the registration id number displayed on your badge
- Provide feedback for this session
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