Getting your work done faster

Support for your entire workflow

Products for the work you do

Platform Productivity

Workflow Depth

Application Breadth

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Platform

Productivity

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Change the Way You Work in MATLAB

See results together with your MATLAB code in the Live Editor (introduced in R2016a)

- Add equations, images, hyperlinks, and formatted text
- Present, share, and collaborate using interactive documents
- Interactive figure updates
  - Pan, zoom, and rotate axes
  - Interactive plot customization, with MATLAB code generation to automate work
- Interactive equation editor
MATLAB Online

- Provides access to MATLAB desktop and full MATLAB language support from any standard web browser
- No downloads or installs.
- Cloud Storage and synchronization via MATLAB Drive
- Log in here with your MathWorks Account: https://matlab.mathworks.com/
App Designer

Environment for building MATLAB apps
(introduced in R2016a)

- Full set of standard user interface components, as well as gauges, knobs, switches, and lamps
- Rich design environment for laying out apps
- Object-based code format for easily sharing data between parts of the app

- Enhancements include:
  - Majority of 2-D plots supported
  - Embed tabular displays using uitable
  - Zoom and pan plots in apps
Apps Simplify Modeling and Simulation

These interactive applications automate common technical computing tasks

- **Signal Analyzer app**
  - Perform time- and frequency-domain analysis of multiple time series

- **Regression Learner app**
  - Train regression models using supervised machine learning

- **Control System Designer app**
  - Design single-input, single-output (SISO) controllers

**Toolboxes:**
- Signal Processing Toolbox
- Statistics and Machine Learning Toolbox
- Control System Toolbox
Working with Data Just Got Easier

New data types and functionality for more efficient storage and managing of data

- **timetable** data container *(introduced in R2016b)*
  - Store time-stamped tabular data
  - Reorganize, evenly space, and align data
- **string** arrays *(introduced in R2016b)*
  - Memory efficient, faster string operations
  - New functions for common string manipulation
- New capabilities for **preprocessing** data
  - Find, fill, and remove missing data
  - Detect and replace outliers
  - Smooth noisy data
Working with Big Data Just Got Easier

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

- Tall arrays let you use familiar MATLAB functions and syntax to work with big datasets, even if they don’t fit in memory
- Support for hundreds of functions in MATLAB and Statistics and Machine Learning Toolbox
- Works with Spark + Hadoop Clusters

Learn more at this session: Big Data and Machine Learning
Working with **Big Data** Just Got Easier in Simulink Too

Stream large input signals from MAT-files without loading the data into memory

- Provides a big data workflow for Simulink simulations
- Use big data in Simulink logging and loading
- Especially useful when running many simulations where data retrieved is too large to fit into memory

Learn more at this session: *Simulink as Your Enterprise Simulation Platform*
Create Your Models Faster

Use automatic port creation and reduced bus wiring

- Add inports and outports to blocks when routing signals

- Quickly group signals as buses and automatically create bus element ports for fewer signal lines
Define your Data Faster

Reduces the need to open separate dialog boxes

- Model and block parameter data is now accessible within the main editor window
- Accessing and defining Stateflow data is also much easier
Simulate your Model Faster

Use the new `parsim` command and JIT acceleration to speed up your simulations

- Directly run multiple parallel simulations from the `parsim` command
- Quickly build the top-level model for improved performance when running simulations in Accelerator mode
- Especially use for Monte Carlo simulations and Design of Experiments

Learn more at this session: *Parallel Computing with MATLAB and Simulink*
Reuse code generated from previous releases

- Reuse code that you generated from previous releases (R2010a and later)
- Avoid reverification cost due to the reuse of unmodified code
Simulink Project Upgrade

Easily update all the models in your Simulink Project to the latest release

- Avoid the manual process of upgrading one model at a time
- Simulink Project upgrade is an easy to use UI to automate the upgrade process of all the models in a Simulink project
- Fixes are automatically applied and a report gets generated

Learn more at this session: Simulink as Your Enterprise Simulation Platform
Platform
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Workflow
Depth

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Support for your entire workflow
Integrate MATLAB Analytics into Enterprise Applications

Deploy MATLAB algorithms without recoding or creating custom infrastructure

- Develop clients for MATLAB Production Server in any programming language that supports HTTP using RESTful API and JSON
- Configure and manage multiple server instances using a web-based interface

Learn more at this session: Integrate MATLAB analytics into enterprise applications
Connecting MATLAB Analytics to IoT Systems

Develop analytics and deploy IoT systems

- Quickly collect and analyze IoT data with ThingSpeak and MATLAB
- Develop analytics algorithms using MATLAB and toolboxes
- Deploy on smart devices using code generation and embedded target support
- Deploy at scale on cloud using ThingSpeak and MATLAB Production Server

Learn more at this session: Developing Analytics and Deploying IoT Systems
New Hardware Support

Run Simulink models on low-cost hardware devices

- Run Simulink models on Raspberry Pi 3 and Google Nexus devices
- Adds to existing hardware support, including LEGO, Arduino, iPhone, and Android devices
More Connections to 3\textsuperscript{rd} Party Tools

Connect your models to Onshape and DOORS Next Generation

- Convert an Onshape CAD assembly into a Simscape Multibody model
- Link and trace model elements to requirements in DOORS Next Generation

Learn more at this session: Modeling Mechanical and Hydraulic Systems in Simscape
Complying with Safety-Critical Standards

Detect and fix standards compliance issues at design time with edit-time checking

- Quickly address compliance and modeling standards issues before running the model
- For example, check for prohibited blocks or block names
- Especially useful for applications that require compliance to standards such as DO-178, ISO 26262, IEC 62304

Learn more at this session: Verification, Validation and Test in Model Based Design
Efficient Code Generation

Improve code quality with clone detection and dynamic memory allocation

- Refactor repeating library patterns and subsystem clones
  - Reduces redundancy
  - Improves reusability

- Generate C code that uses dynamic memory allocation from MATLAB Function blocks
  - Allocate memory as needed at runtime

Learn more at this session: Generating Optimized Code for Embedded Microcontroller Algorithms
Floating Point HDL Code Generation

Generate HDL code directly from single-precision floating point Simulink models

- Generates native floating-point arithmetic HDL code complying to IEEE-754 standard
- Optimize for speed versus area using custom block-level settings
- Balance numerical accuracy versus hardware resource usage by mixing integer, fixed-point, and floating point operations.

Learn more at this session:
*Designing and Implementing Real-Time Signal Processing Systems*
Code Verification

Detect and prove the absence of run-time errors in your source code using static analysis

- Identify CERT C violations using defect checkers and coding rules
- Detect security vulnerabilities highlighted by the CERT C standard
- Addresses growing concern over software security with the rise in system connectivity

Learn more at this session:
Prove the Quality and Achieve MISRA compliance with Formal Methods Based Technique for High Integrity applications
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Getting your work done faster
Model and simulate automotive powertrain systems

Accelerate your powertrain controls development process

- Simulate engine and controller subsystems, transmission assemblies, battery packs
- Use pre-built conventional, EV, and HEV vehicle models that can be parameterized and customized
- Run fuel economy and performance simulations
- Deploy fast-running models onto HIL systems
Gas Domain and Block Library

Model gas systems with various levels of idealization

- Pneumatic actuation
- Gas transport in pipe networks
- Gas turbines for power generation
- Air cooling of thermal components
- Perfect gas, semiperfect gas, or real gas
Support for the Latest Wireless Standards

Generate IEEE 802.11ad compliant waveforms and simulate 3GPP 5G radio technologies

- IEEE 802.11ad is a new Wi-Fi standard intended for high data rate short range communication – e.g., streaming video between a phone and a TV

- A new 5G library is available to explore the behavior and performance of new proposed 5G radio technologies
Machine Learning

“Learn" information directly from data without assuming a predetermined equation as a model

- Regression Learner app
  - Choose from multiple algorithms
  - Train and validate multiple models
  - Assess model performance, compare results, and choose the best model

- Code generation
  - Generate C code for predictive models that can be deployed directly to hardware devices

Learn more at this session:
Big Data and Machine Learning
Deep Learning

Apply deep learning to computer vision problems

- Configure and train models using object detection algorithms 
  \((R-CNN, \text{Fast } R-CNN, \text{Faster } R-CNN)\)
- Leverage pretrained models for transfer learning 
  \((\text{AlexNet, VGG-16, VGG-19})\)
- Import models from Caffe
- Train networks using multiple GPUs 
  \((\text{including on Amazon EC2})\)

Learn more at this session:
*Simplifying Image Processing and Computer Vision Application Development*
Autonomous Driving Systems

Design, simulate, and test ADAS and autonomous driving systems

- Algorithm development
  - Sensor Fusion
  - Computer Vision
  - Deep learning

- Visualization tools

- Testing and verification
  - Ground Truth Labeling App
  - Traffic scenario generation

Learn more at this session:
Developing and Validating Perception Systems for ADAS & Automated Driving

**New Training Courses**
- Code Generation for AUTOSAR Software Components
- Testing Generated Code in Simulink
- Accelerating and Parallelizing MATLAB Code
- Communications System Design with MATLAB
- SimEvents for Discrete-Event System Modeling
- Software-Defined Radio with Zync using Simulink

**New Training Modules**
- Object Oriented Design with MATLAB
- Modeling RF Systems using MathWorks Tools
- Modeling Radar Systems using Phased Array Systems Toolbox
- Modeling Wireless Communication Systems using Phased Array Systems Toolbox
- Real-Time Testing with Simulink Real-Time and Speedgoat Hardware

**Self-Paced Online Training Offerings**
- MATLAB Onramp (Free)
- MATLAB Fundamentals
- MATLAB Programming Techniques
- MATLAB for Data Processing and Visualization
- Machine Learning with MATLAB
- MATLAB for Financial Applications
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What's New in MATLAB and Simulink?

Platform Productivity
- Live Editor
- MATLAB Apps
- New (big) data types
- Modeling enhancements
- Release adoption

Workflow Depth
- Enterprise applications
- IoT systems
- 3rd party tool integration
- Standards compliance
- Code generation and verification

Application Breadth
- Powertrain systems
- New wireless standards
- Machine learning
- Deep learning
- Autonomous driving
MATLAB EXPO 2017
Thank You