Introduction to MATLAB

Sean de Wolski
Application Engineer
What is MATLAB?

- High-level language
What is MATLAB?

- High-level language
- Interactive development environment
What is MATLAB?

- High-level language
- Interactive development environment
- Used for:
  - Numerical computation
  - Data analysis and visualization
  - Algorithm development and programming
  - Application development and deployment
Technical Computing Workflow

Access
- Files
- Software
- Hardware

Explore & Discover
- Data Analysis & Modeling
- Algorithm Development
  - for k=1:max
  - x = fft(dat)
  - y = 20*log1
- Application Development

Share
- Reporting and Documentation
  - PDF
  - doc
  - HTML
- Outputs for Design
- Deployment
  - MATLAB
  - Excel
  - .NET
  - C/C++
  - Java
  - .dll

Automate
Demo: Fuel Economy Analysis

- **Goal:**
  - Study the relationships between fuel economy, horsepower, and type of vehicle

- **Approach:**
  - Access data from Excel
  - Interactively visualize and explore trends
  - Create a model
  - Document results in a report
Demo: Fuel Economy Analysis

Access
- Files
- Software
  - Code & Applications
  - Hardware

Explore & Discover
- Data Analysis & Modeling
- Algorithm Development

Data Analysis & Modeling

for k=1:max
x = fft(dat)
y = 20*log1

Application Development

Algorithm Development

Share
- Reporting and Documentation
- Outputs for Design
- Deployment

Products Used
- MATLAB
- Statistics Toolbox
- Curve Fitting Toolbox

Software
- MATLAB
- Statistics Toolbox
- Curve Fitting Toolbox
Accessing Data from MATLAB

**Access**

- Files
  - Excel, text, or binary
  - Audio and video, image
  - Scientific formats and XML

**Explore & Discover**

**Share**
Accessing Data from MATLAB

- **Files**
  - Excel, text, or binary
  - Audio and video, image
  - Scientific formats and XML

- **Web Services**
  - JSON, CSV, and image data
  - Financial Datafeeds (*Datafeed Toolbox*)
Accessing Data from MATLAB

- Applications and languages
  - C/C++, Java, FORTRAN
  - COM, .NET, shared libraries
  - Databases (*Database Toolbox*)
Accessing Data from MATLAB

- Applications and languages
  - C/C++, Java, FORTRAN
  - COM, .NET, shared libraries
  - Databases (*Database Toolbox*)

- Measurement hardware
  - Data acquisition hardware (*Data Acquisition Toolbox*)
  - Stand-alone instruments and devices
    (*Instrument Control Toolbox*)
Data Analysis and Visualization in MATLAB

- Built-in engineering and mathematical functions
  - Interpolation, filtering, smoothing, Fourier analysis

- Extensive plotting capabilities
  - 2-D, 3-D, and volume visualization
  - Tools for creating custom plots
Expanding the Capabilities of MATLAB

- MathWorks add-on tools for:
  - Math, statistics, and optimization
  - Control system design and analysis
  - Signal processing and communications
  - Image processing and computer vision
  - Parallel computing and more...

- Partner products provide:
  - Additional interfaces
  - Domain-specific analysis
  - Support for niche applications
Sharing Results from MATLAB

- Automatically generate reports
  - Publish MATLAB files
  - Customize reports using MATLAB Report Generator

- Package as an app or custom toolbox

- Deploy applications to other environments
Using MATLAB

- High-level language
  - Native support for vector and matrix operations
  - Built-in math and visualization functions
Using MATLAB

- High-level language
  - Native support for vector and matrix operations
  - Built-in math and visualization functions

- Development environment
  - Interactive and easy to get started
  - Ideal for iterative exploration and design
Using MATLAB

- High-level language
  - Native support for vector and matrix operations
  - Built-in math and visualization functions

- Development environment
  - Interactive and easy to get started
  - Ideal for iterative exploration and design

- Technical computing platform
  - Add-on products for a range of application areas
    *(e.g., signal processing and communications, image and video processing, control systems, test and measurement)*
Questions?