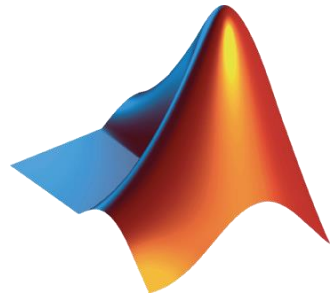
# Introduction to MATLAB

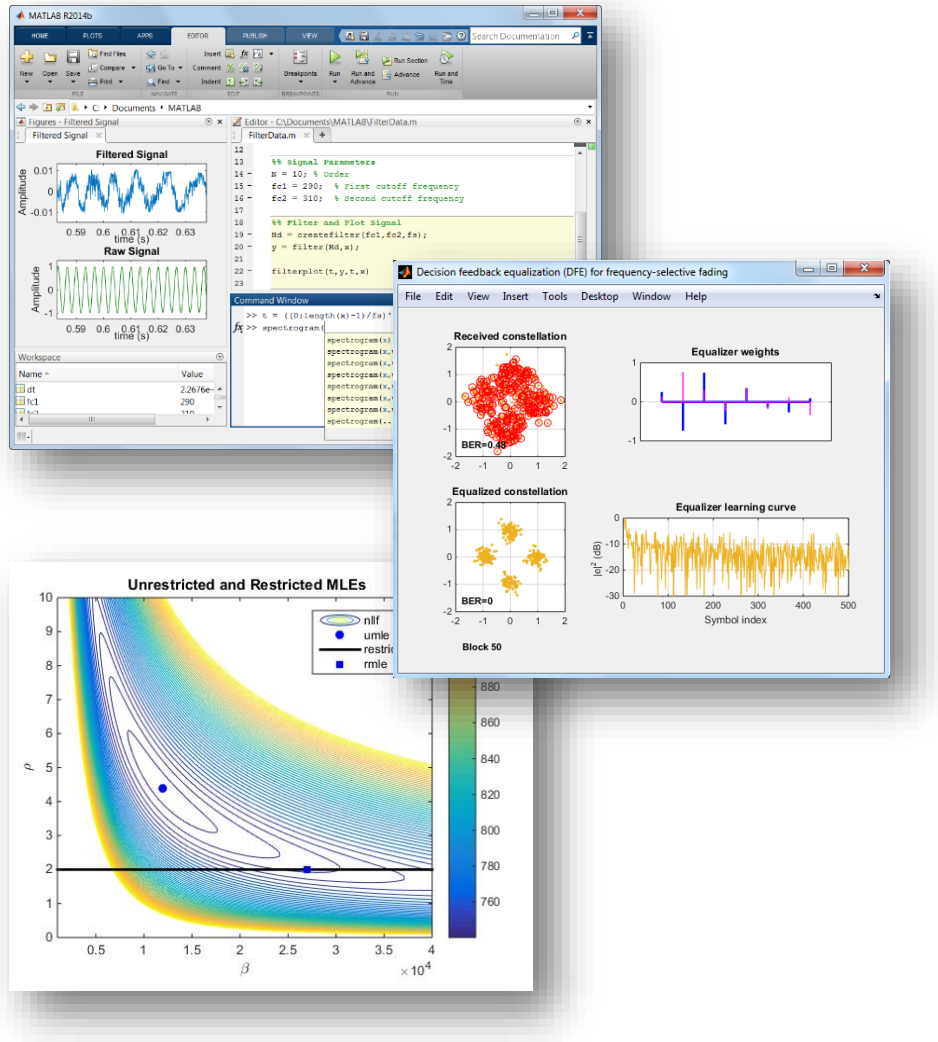


Sean de Wolski
Application Engineer

© 2015 The MathWorks, Inc.

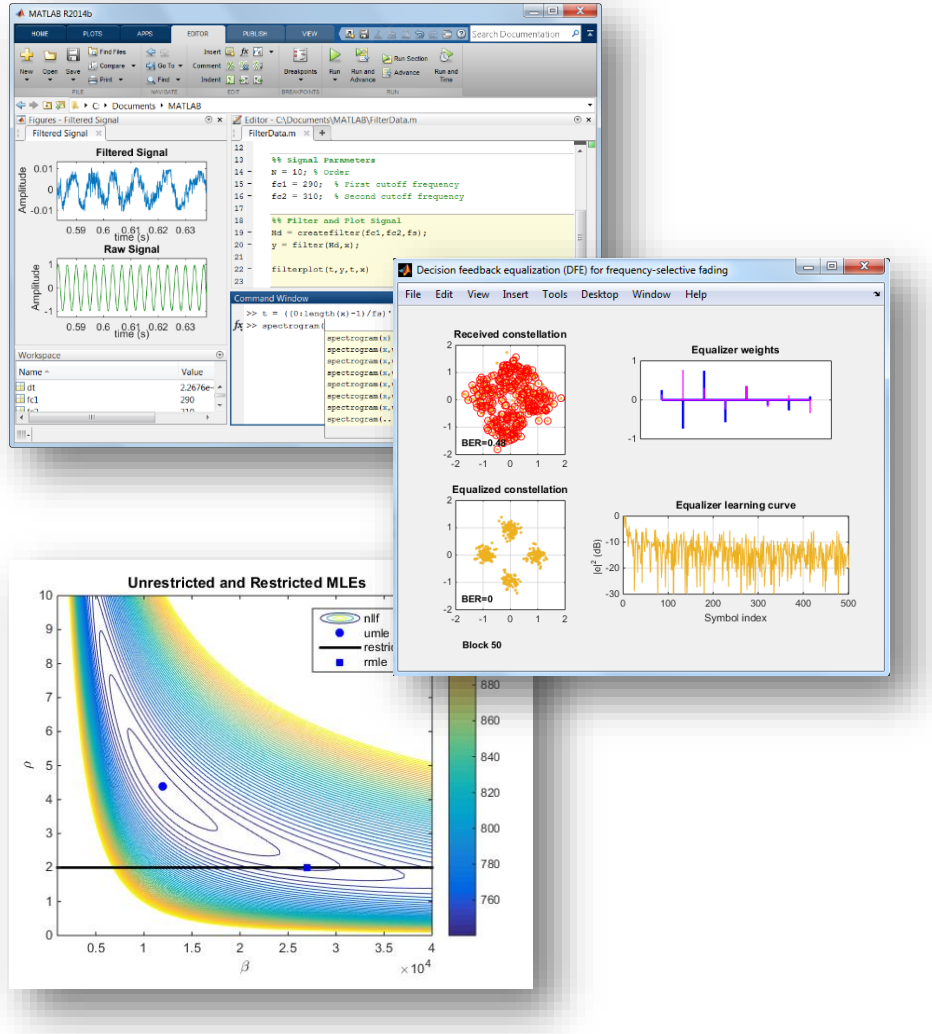
# What is MATLAB?

- High-level language



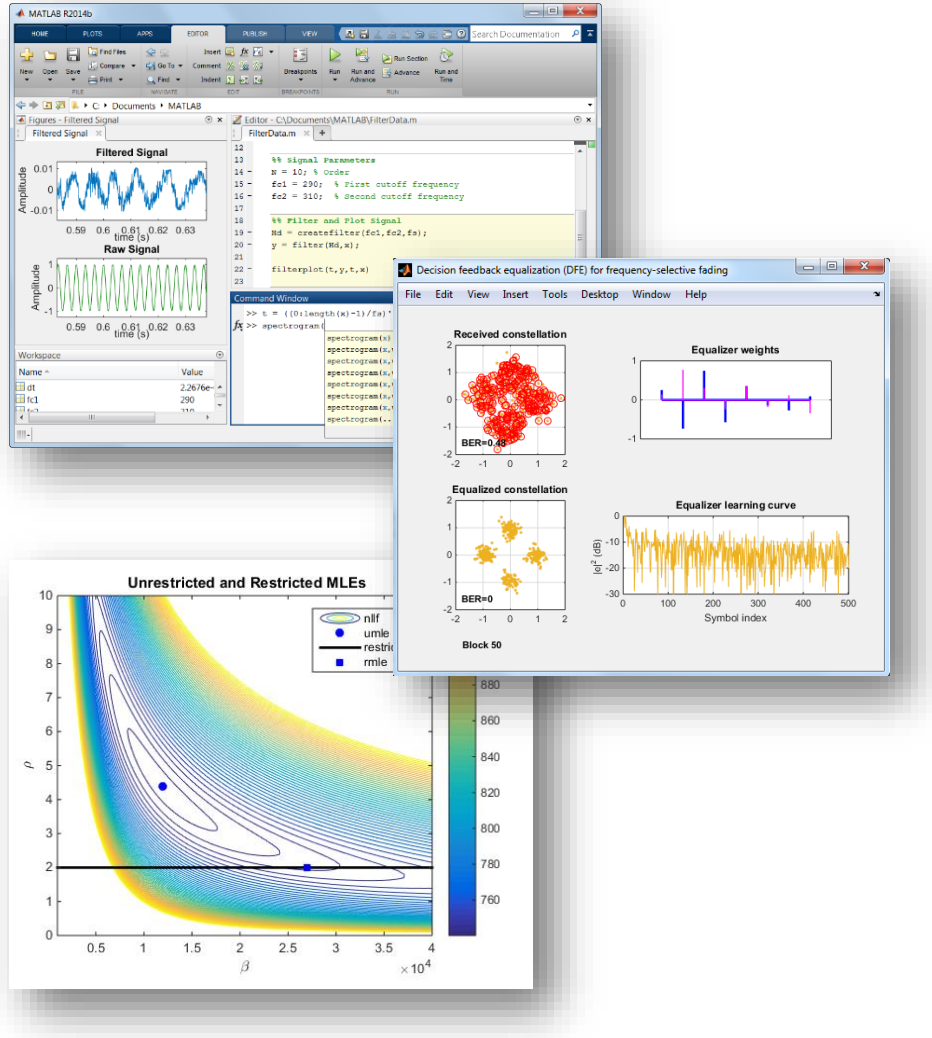
# What is MATLAB?

- High-level language
- Interactive development environment

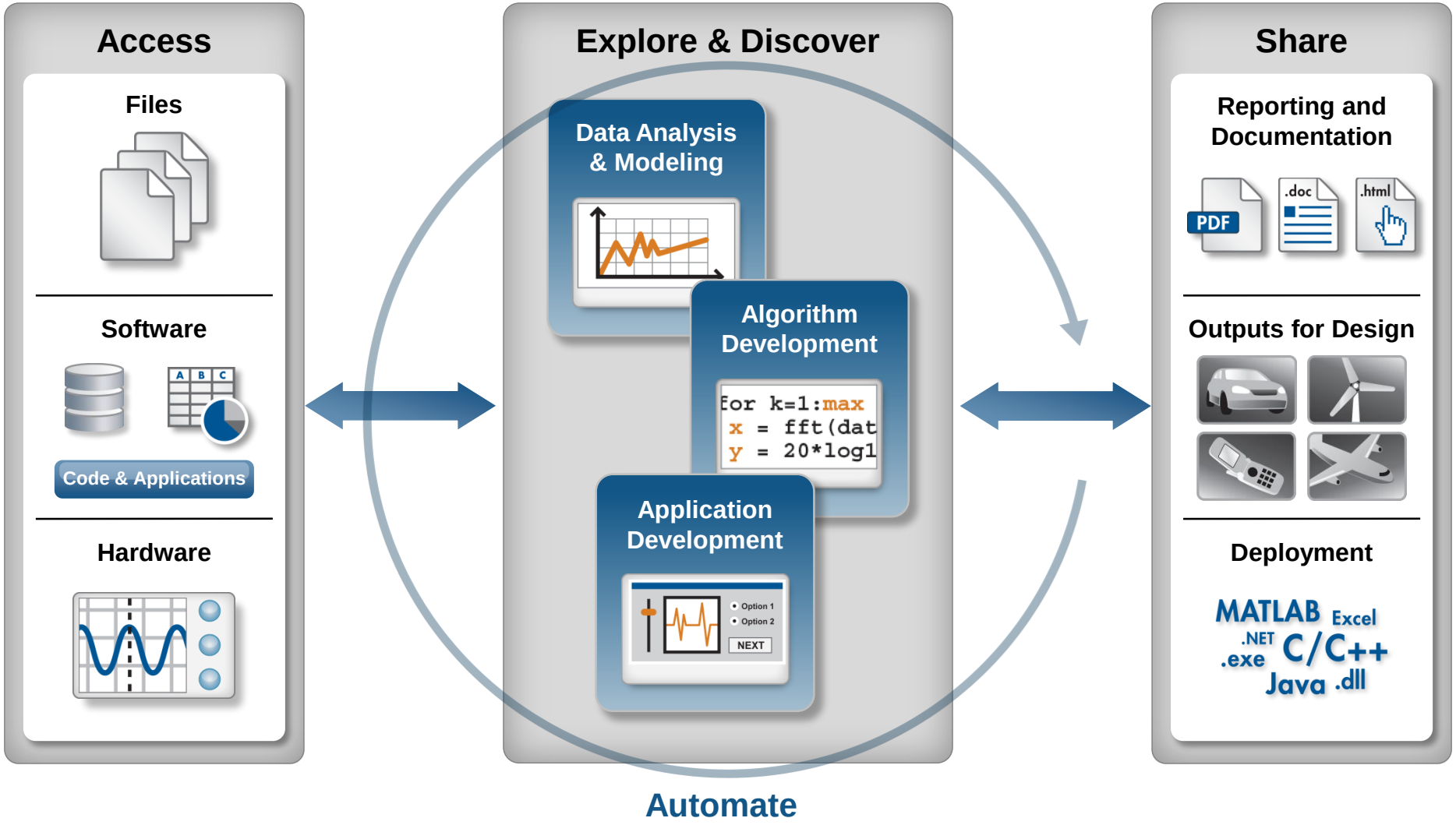


# What is MATLAB?

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

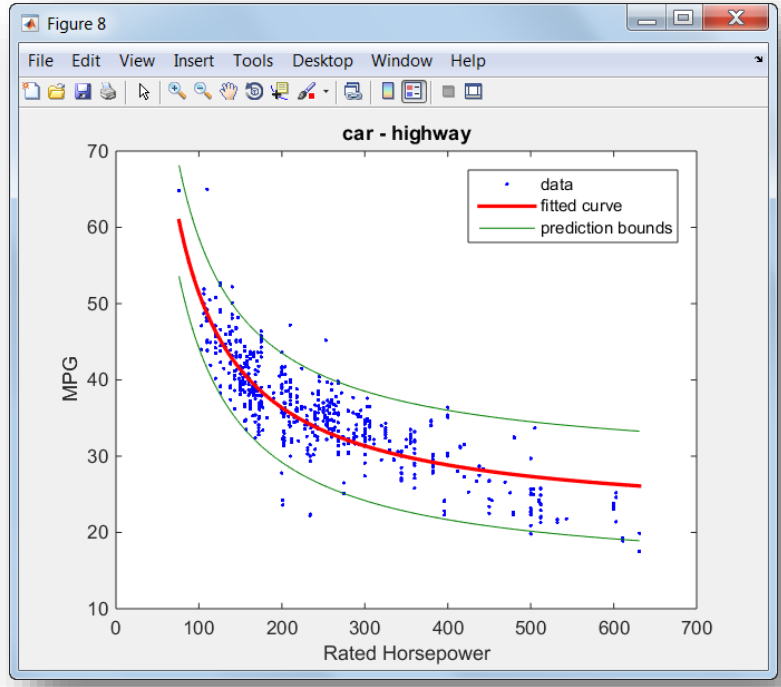


# Technical Computing Workflow



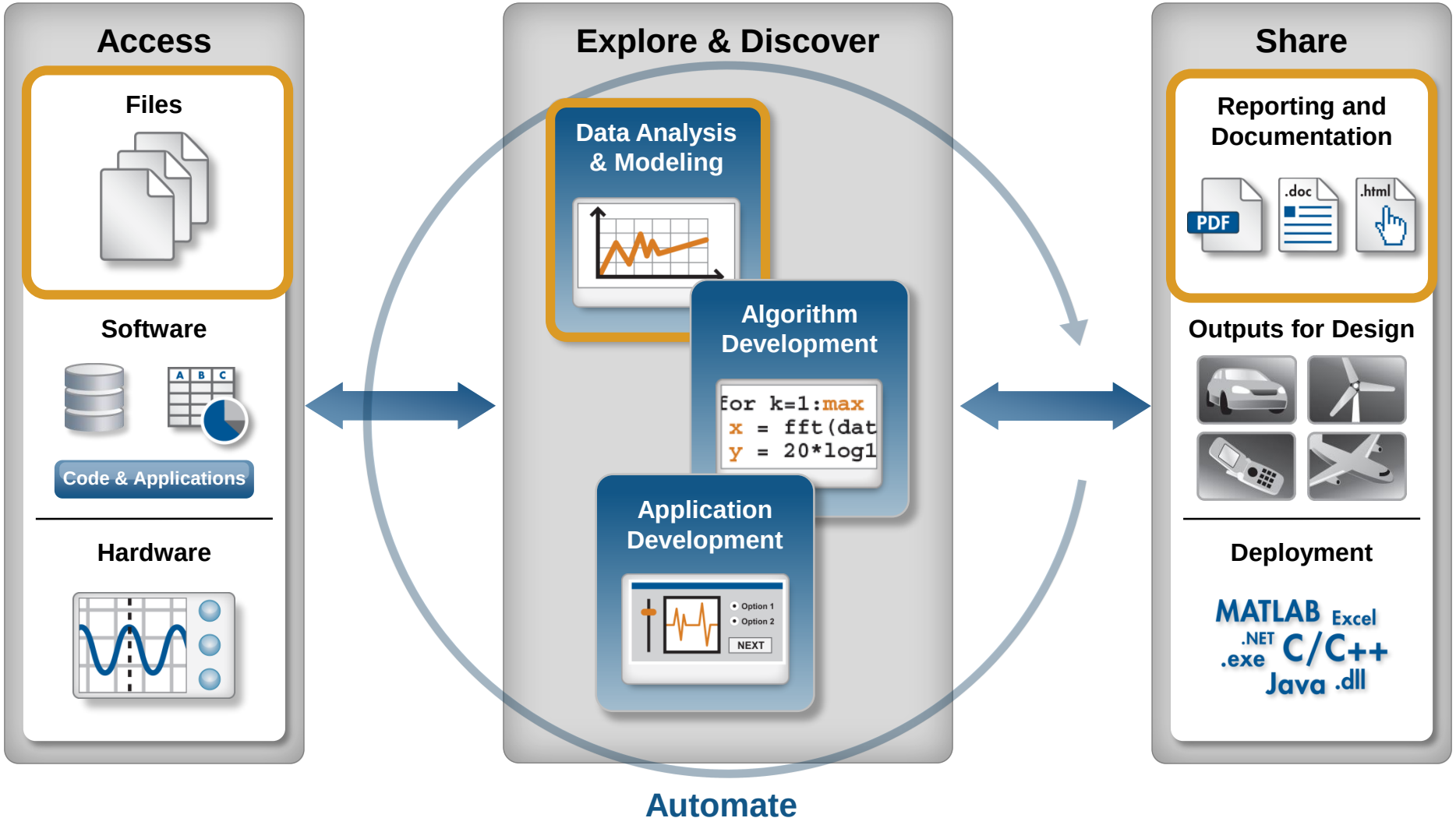
# Demo: Fuel Economy Analysis

- 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

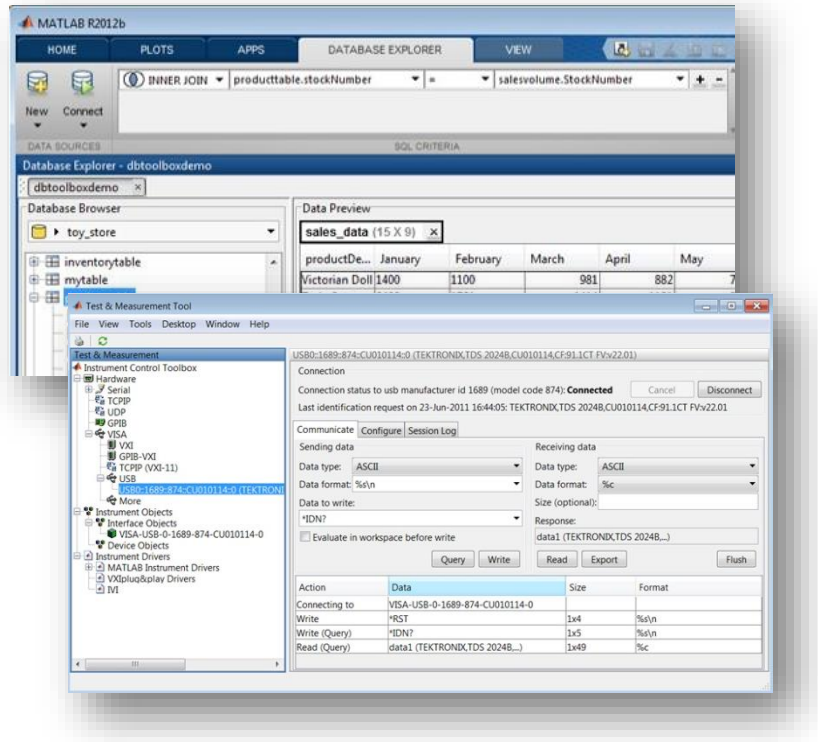
**Products Used**
- MATLAB
- Statistics Toolbox
- Curve Fitting Toolbox



# Accessing Data from MATLAB

**Access** | Explore & Discover | Share

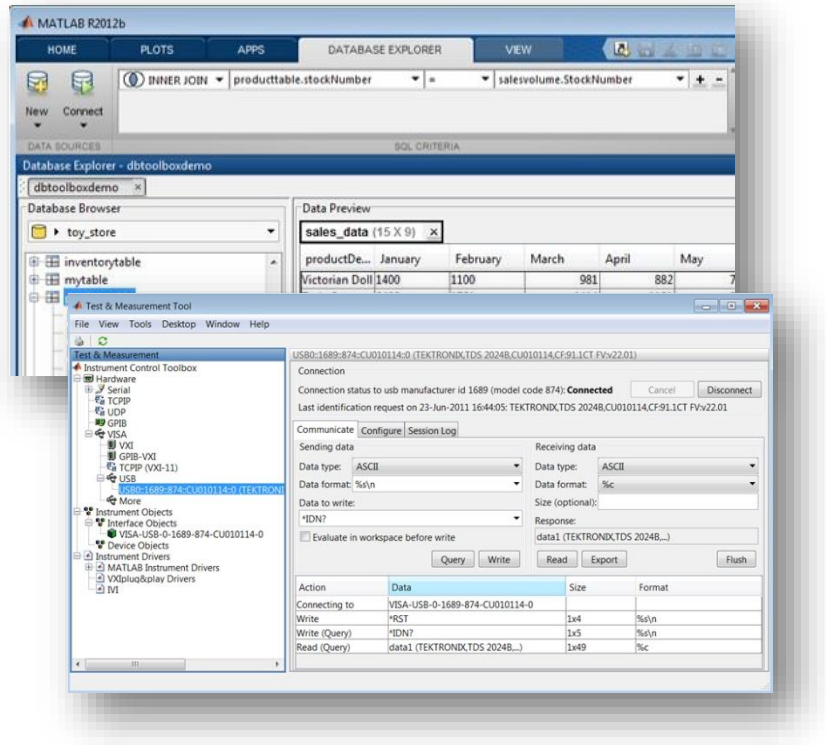
- Files
  - Excel, text, or binary
  - Audio and video, image
  - Scientific formats and XML



# Accessing Data from MATLAB

**Access** | Explore & Discover | Share

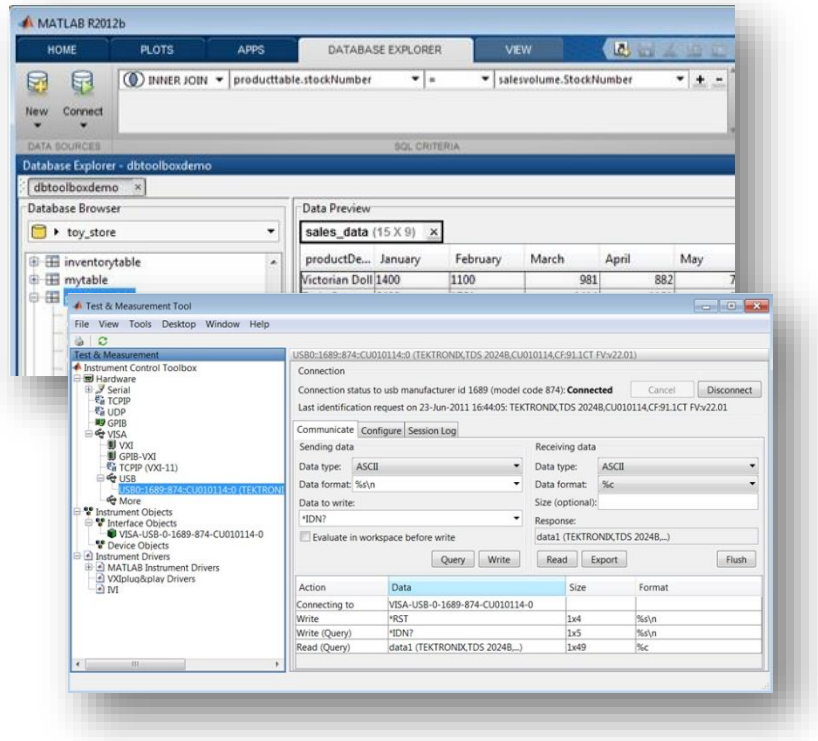
- Files
  - Excel, text, or binary
  - Audio and video, image
  - Scientific formats and XML
- Web Services
  - JSON, CSV, and image data
  - Financial Datafeeds *(Datafeed Toolbox)*



# Accessing Data from MATLAB

**Access** | Explore & Discover | Share

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

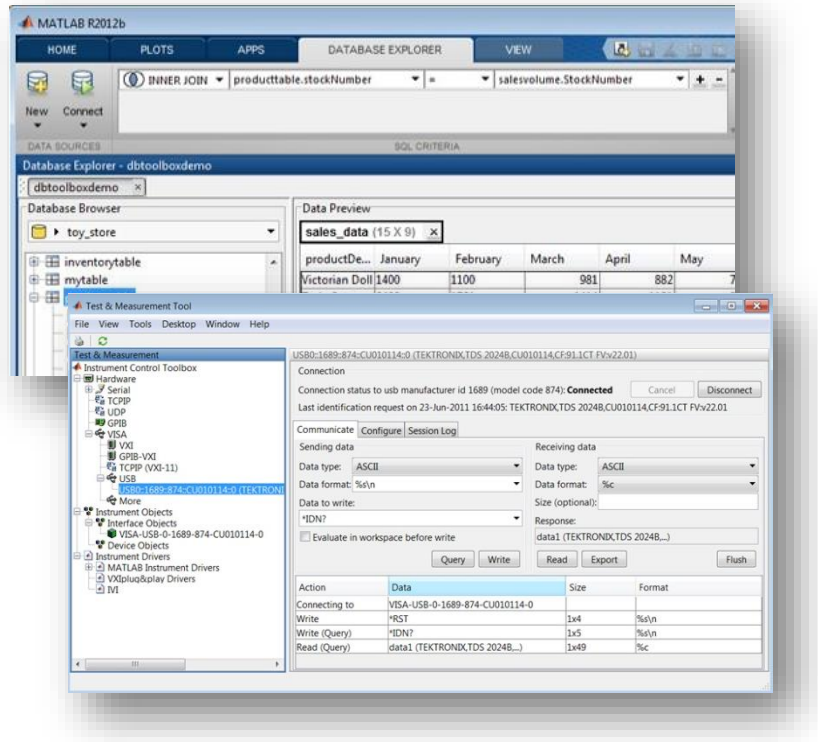


# Accessing Data from MATLAB

**Access** | Explore & Discover | Share

- 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

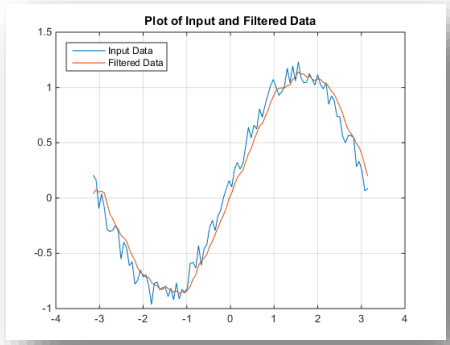
    *(Instrument Control Toolbox)*



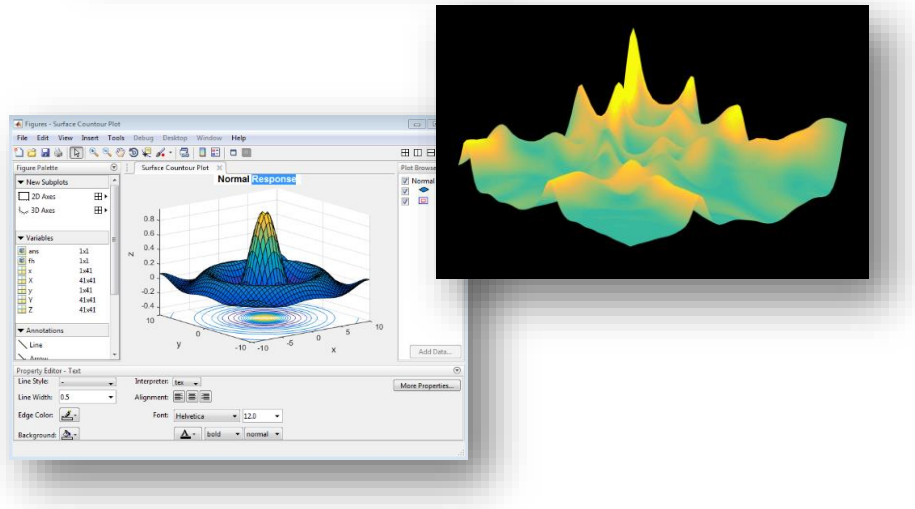
# Data Analysis and Visualization in MATLAB

Access | **Explore & Discover** | Share

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



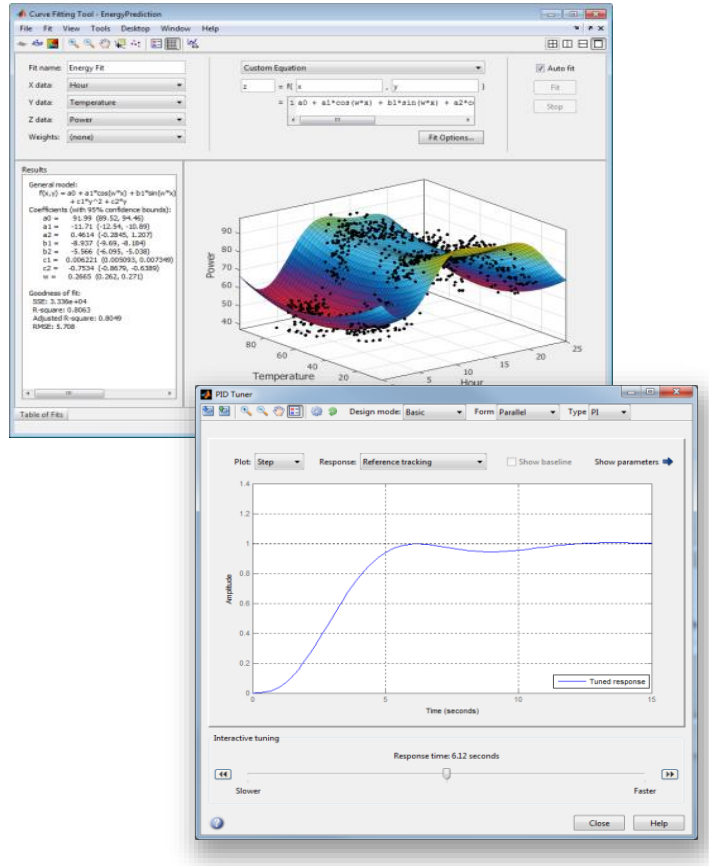

- Extensive plotting capabilities
  - 2-D, 3-D, and volume visualization
  - Tools for creating custom plots



# Expanding the Capabilities of MATLAB

Access | **Explore & Discover** | Share

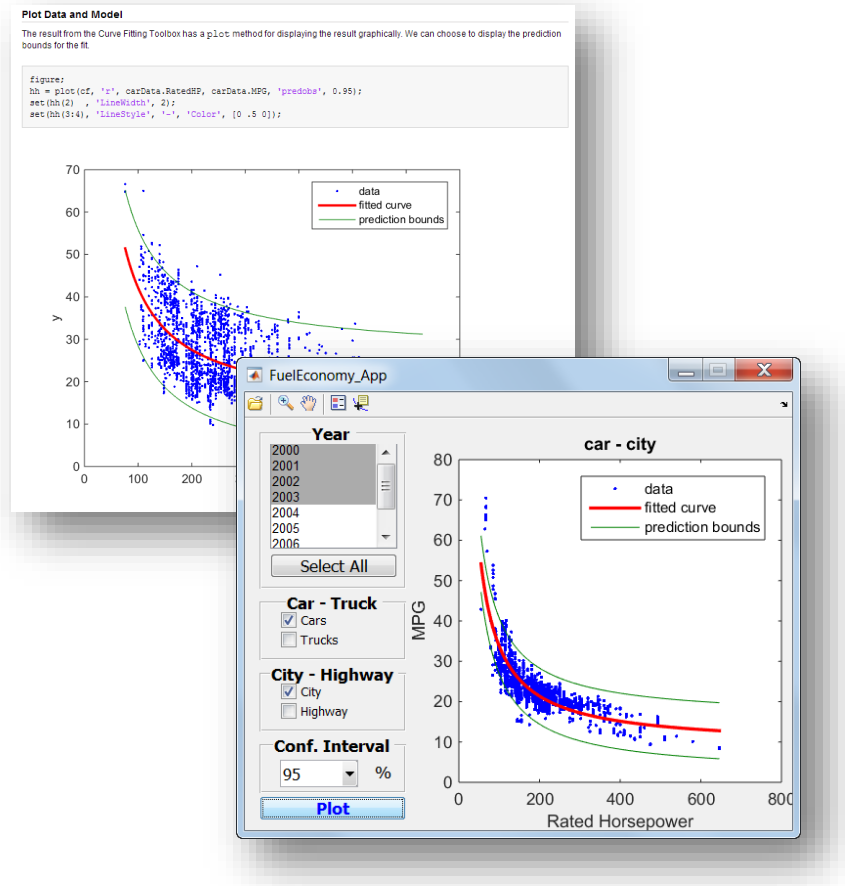
- MathWorks add-on tools for:
  - Math, statistics, and optimization
  - Control system design and analysis
  - Signal processing and communications
  - Image processing and computer vision
  - Parallel computing and more…
- Partner products provide:
  - Additional interfaces
  - Domain-specific analysis
  - Support for niche applications



# Sharing Results from MATLAB

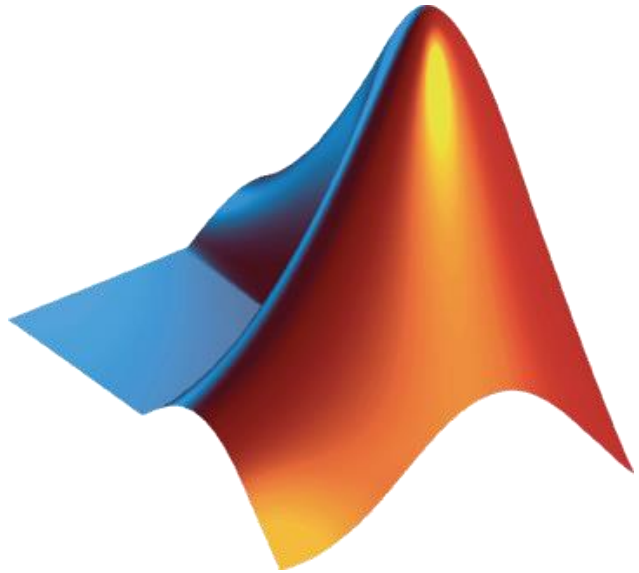
Access | Explore & Discover | **Share**

- Automatically generate reports
  - Publish MATLAB files
  - Customize reports using MATLAB Report Generator
- Package as an app or custom toolbox
- Deploy applications to other environments



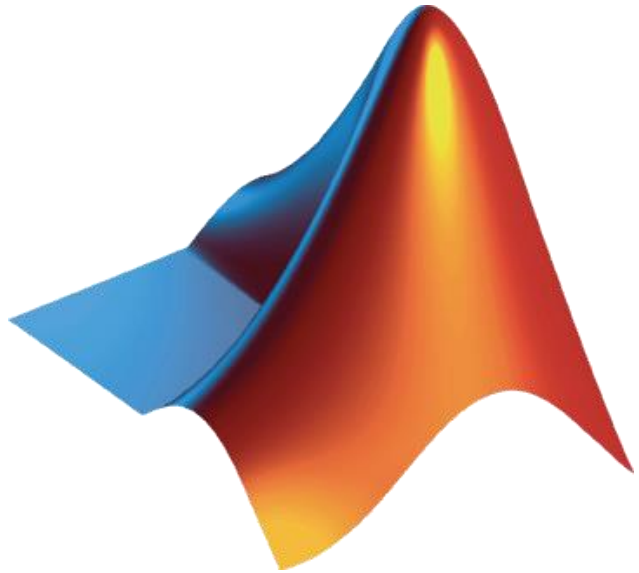
# Using MATLAB

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



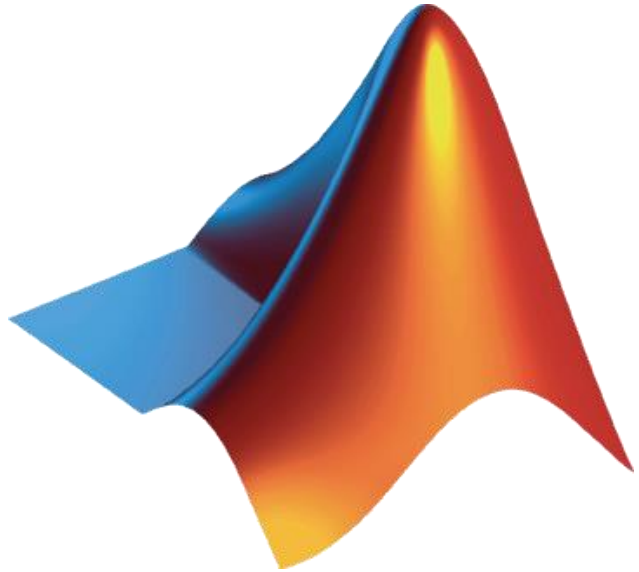
# Using MATLAB

- 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

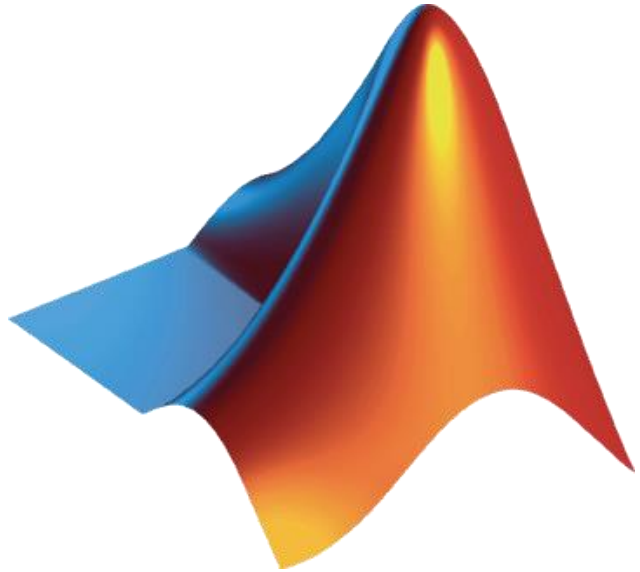
- High-level language
  - Native support for vector and matrix operations
  - Built-in math and visualization functions



- 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?



MATLAB and Simulink are registered trademarks of The MathWorks, Inc. See www.mathworks.com/trademarks for a list of additional trademarks.
Other product or brand names may be trademarks or registered trademarks of their respective holders. © 2015 The MathWorks, Inc.

© 2015 The MathWorks, Inc.