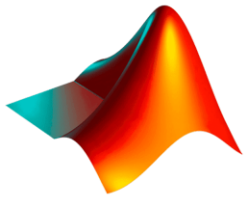
Computer Application (MATLAB)

تطبيقات الحاسبة (ماتلاب)
2025-2024

MATLAB Introduction

by
Dr Murtada Dohan



MATLAB®

Agenda

- What is MATLAB?
- Brief History of MATLAB
- Advantages of MATLAB
- Applications of MATLAB
- MATLAB Environments
- MATLAB Windows

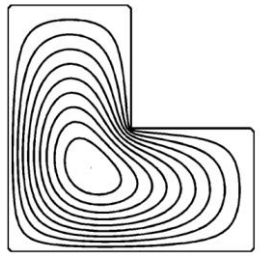
What is MATLAB?

- MATLAB (Matrix Laboratory) is a high-level programming language and environment.
- Widely used for numerical computing, data analysis, simulations, and algorithm development.
- Essential tool in fields like engineering, data science, and applied mathematics.

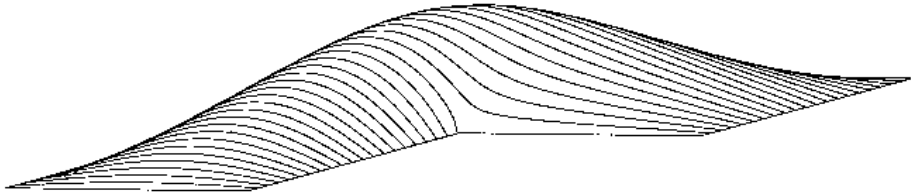
Brief History of MATLAB

- Developed by Cleve Moler in the late 1970s.
- Initially used for matrix calculations and linear algebra.
- Commercial release by MathWorks in 1984.
- Expanded to include graphics, toolboxes, and a broader range of applications over time.
- Continuous updates with features like machine learning, big data analytics, and cloud support.

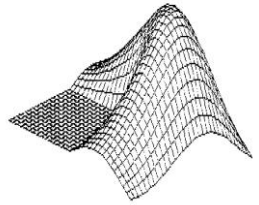
Brief History of MATLAB



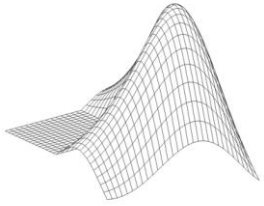
1964



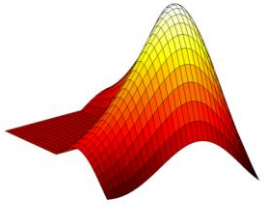
1968



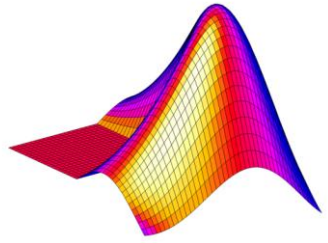
1985



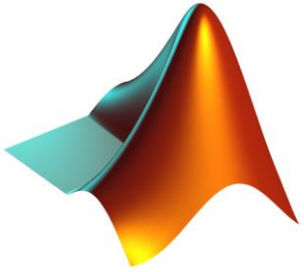
1987



1992



1994



1996

MATLAB®

Advantages of MATLAB

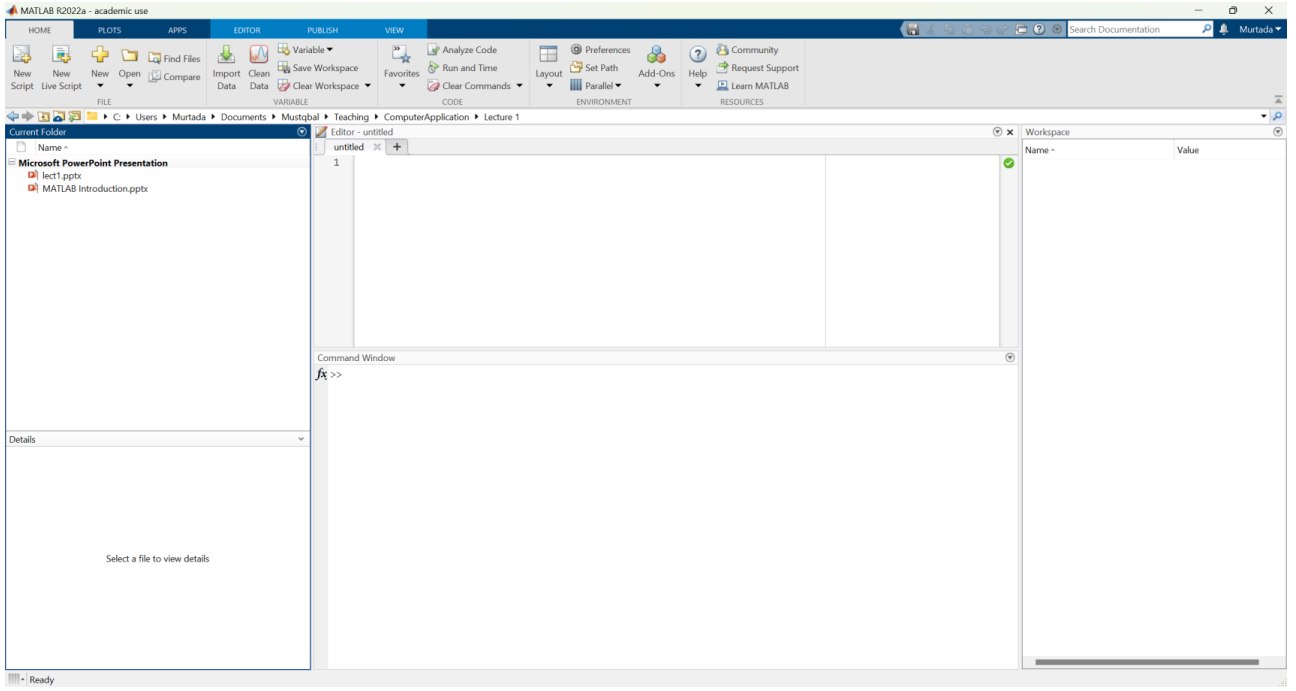
- **Ease of Use**: Simple syntax and built-in functions for quick results.
- **Powerful Visualization**: Advanced plotting and data visualization tools.
- **Extensive Libraries**: Wide range of toolboxes for specialized tasks.
- **Interactivity**: Immediate execution of commands in the Command Window.
- **Cross-Platform Support**: Runs on Windows, macOS, and Linux.
- Integration: Easily interfaces with other languages like Python, C/C++, and Java.

Applications of MATLAB

- **Engineering**: Simulations, control systems, and signal processing.
- **Data Science**: Data visualization, machine learning, and statistical analysis.
- **Research & Academia**: Numerical methods, algorithm development, and modelling.
- **Finance**: Risk management, optimization, and financial modelling.
- **Image and Signal Processing**: Manipulation and analysis of visual and audio data.

MATLAB Environment

- MATLAB consists of various tools that help perform computations and visualize data.
- Integrated Development Environment (IDE) features include multiple windows for code execution, data management, and debugging.



MATLAB®

MATLAB R2022a - academic use

HOME | PLOTS | APPS | EDITOR | PUBLISH | VIEW

Search Documentation | Murtada

New Script | New Live Script | New | Open | Find Files | Compare — FILE

Import Data | Clean Data | Variable | Save Workspace | Clear Workspace — VARIABLE

Favorites | Analyze Code | Run and Time | Clear Commands — CODE

Layout | Preferences | Set Path | Parallel | Add-Ons — ENVIRONMENT

Help | Community | Request Support | Learn MATLAB — RESOURCES

C: ▸ Users ▸ Murtada ▸ Documents ▸ Mustqbal ▸ Teaching ▸ ComputerApplication ▸ Lecture 1

Current Folder

Name

Microsoft PowerPoint Presentation
- lect1.pptx
- MATLAB Introduction.pptx

Details

Select a file to view details

Editor - untitled

untitled

1

Command Window

>>

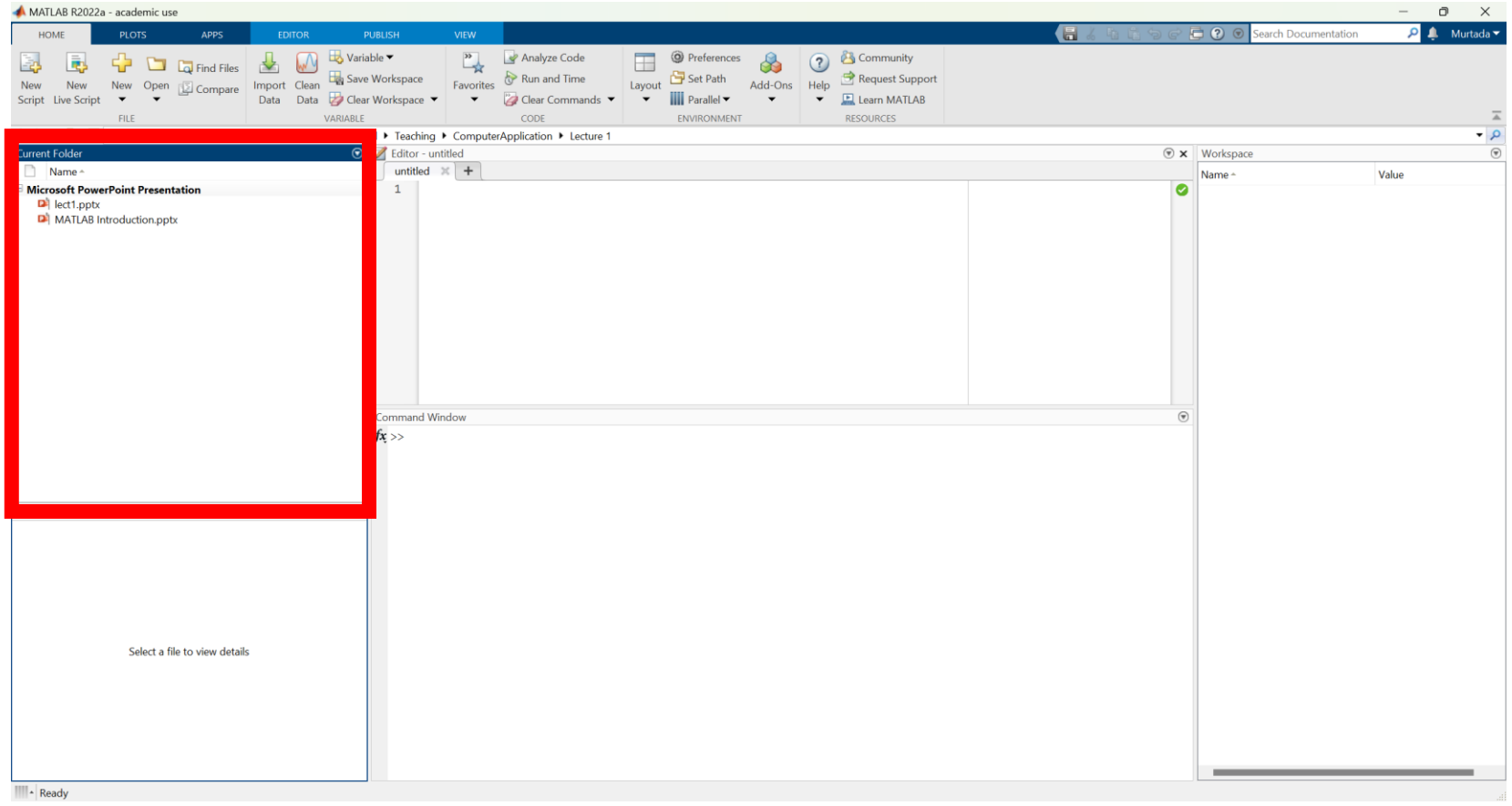
Workspace

Name | Value

Ready | Zoom: 110% | UTF-8 | CRLF | script | Ln 1 | Col 1

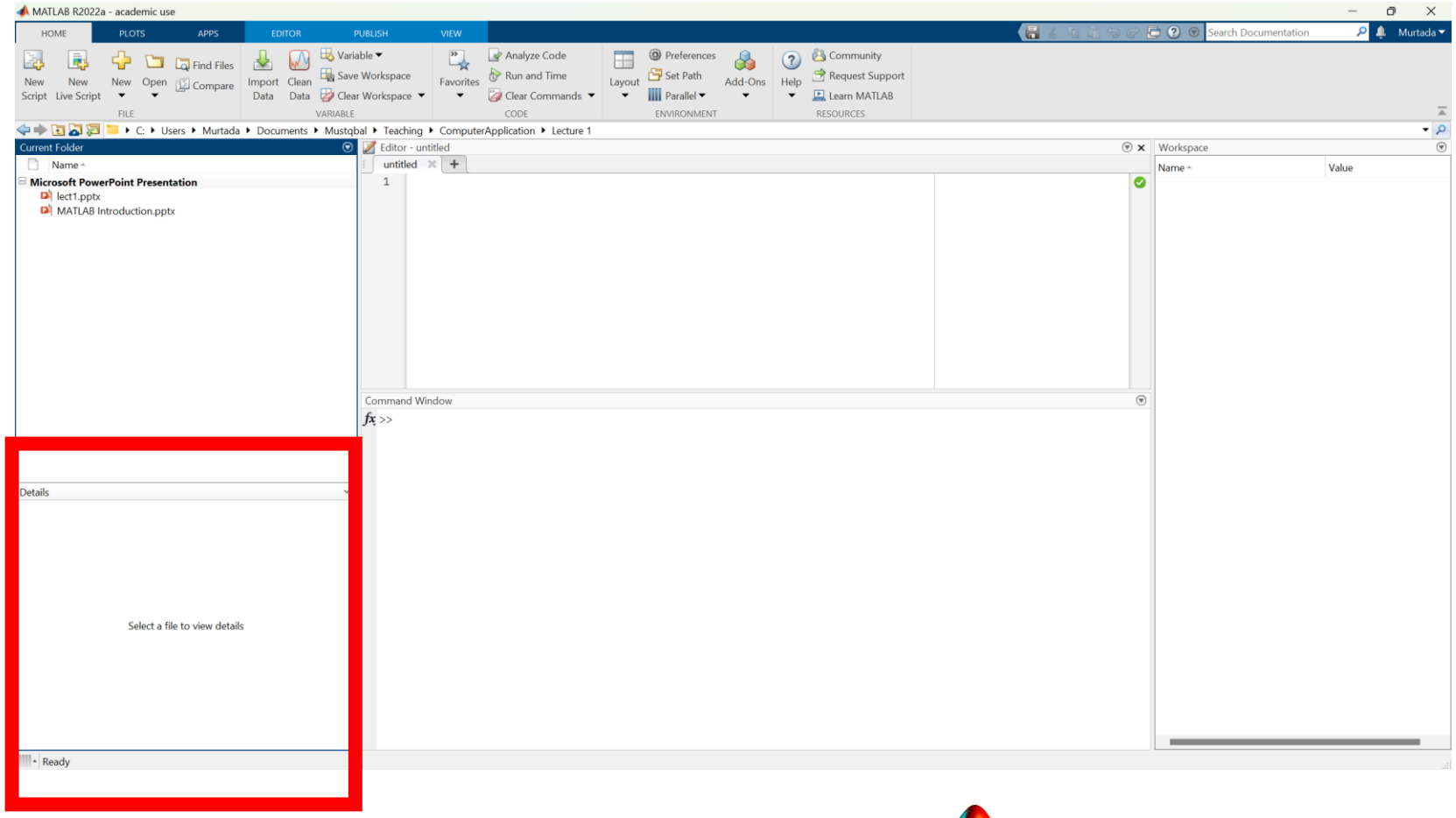
MATLAB Windows: Current Folder

- Shows the current directory and allow to navigate to any folder in the hard drive



MATLAB Windows: Details

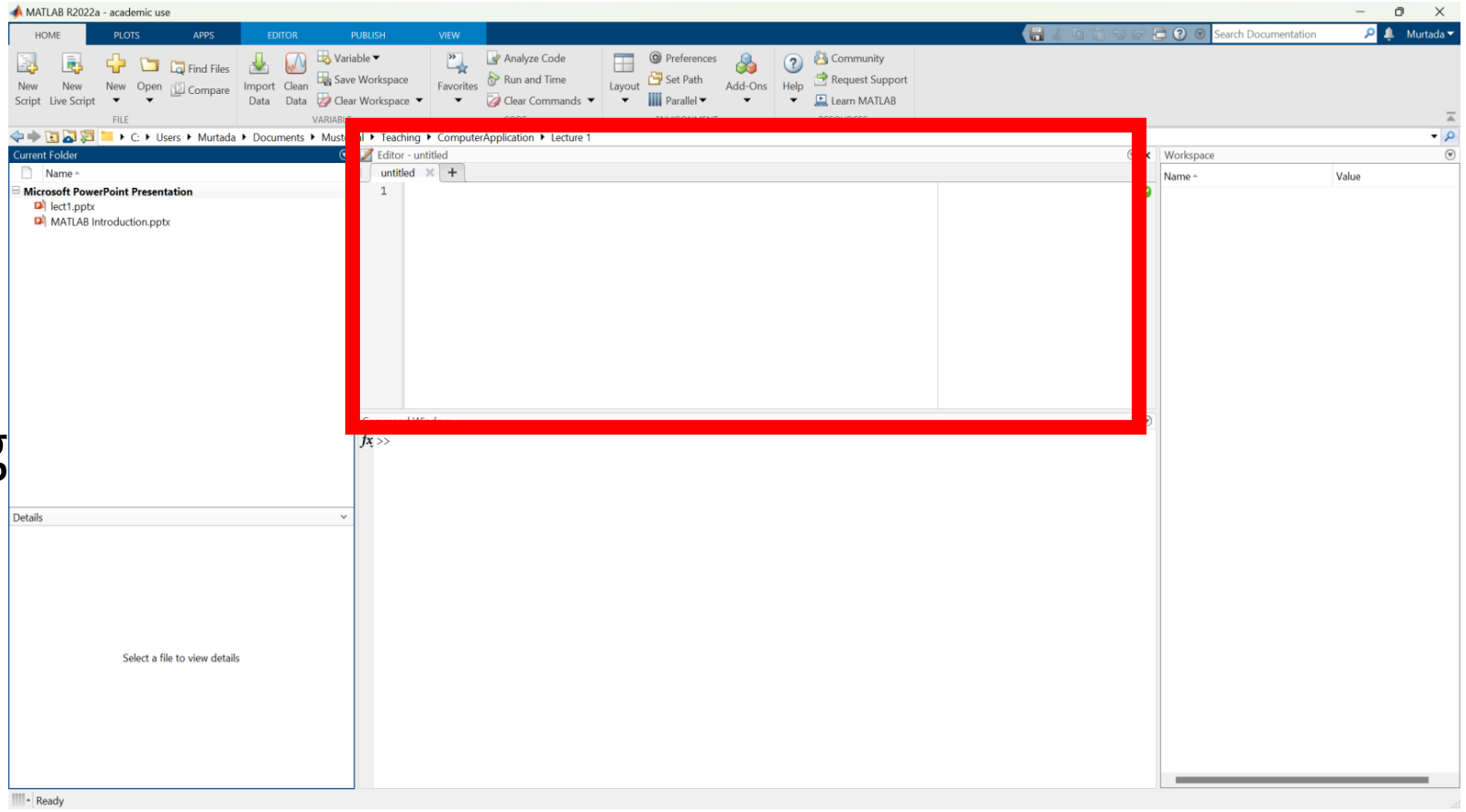
- Shows the content or information of any mat file from the directory



MATLAB®

MATLAB Windows: Editor

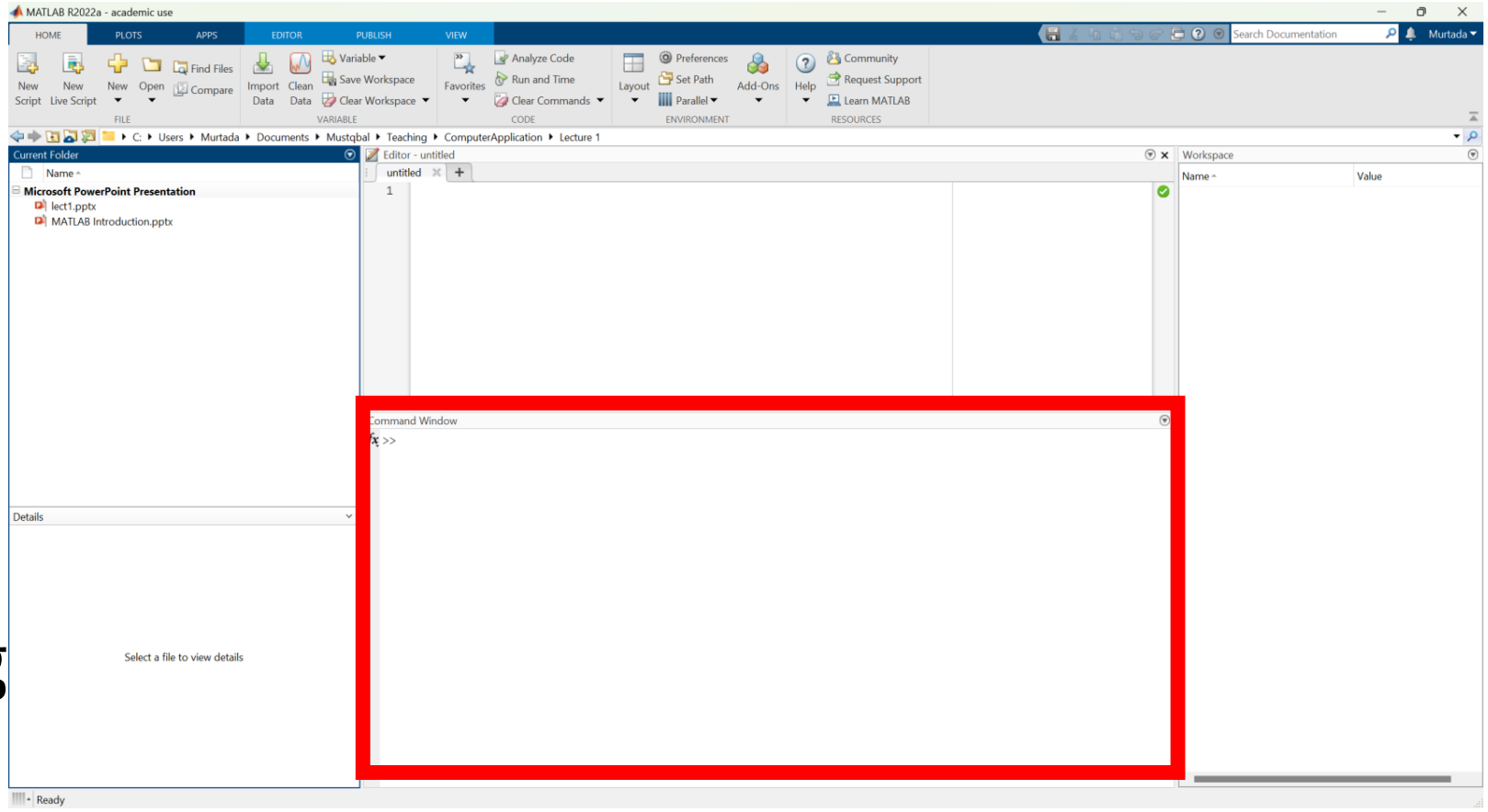
- Used to write, save, and debug MATLAB scripts and functions.
- Features syntax highlighting, code suggestions, and debugging tools.
- Ideal for developing larger, more complex programs.



MATLAB®

MATLAB Windows: Command window

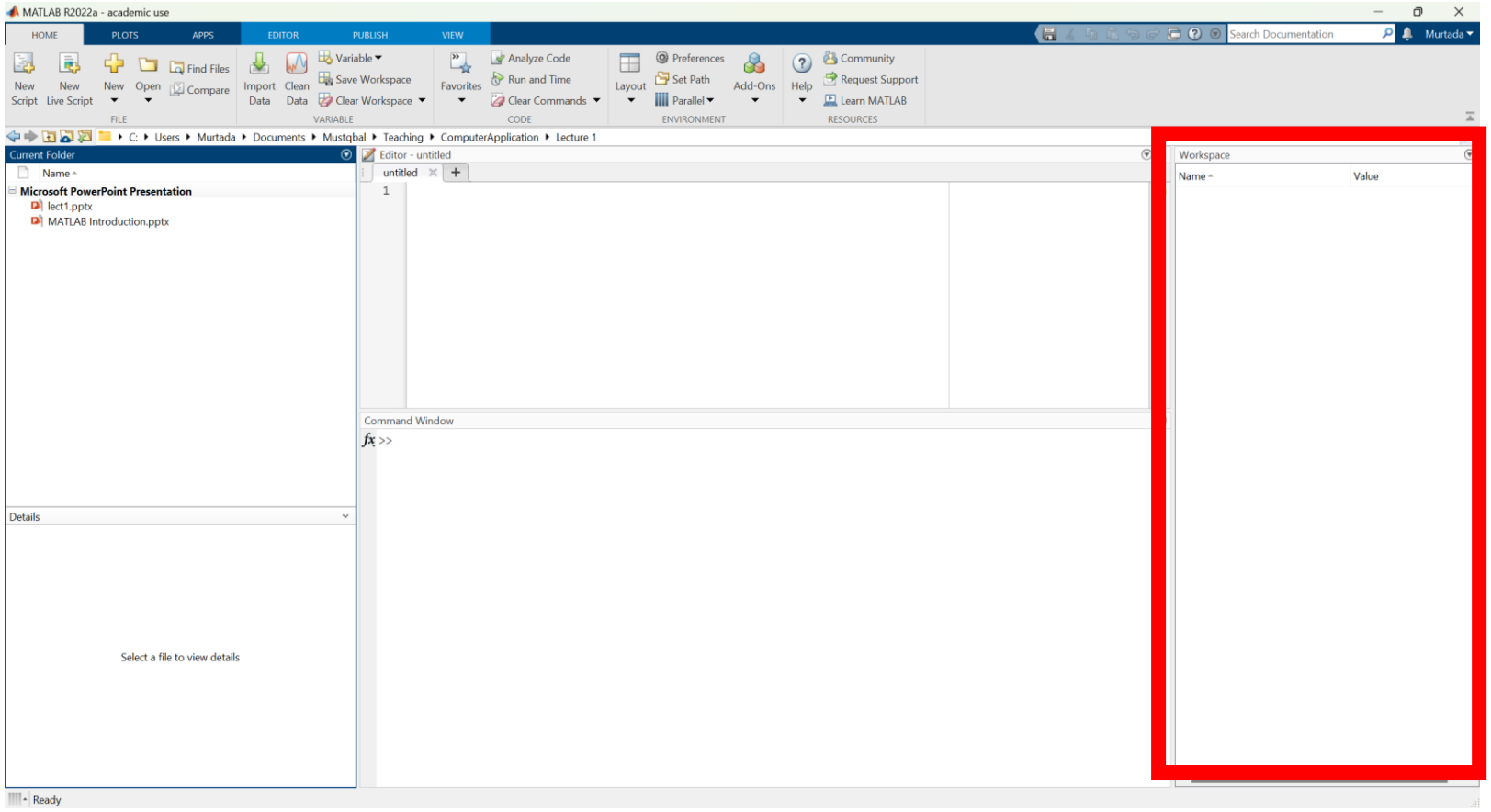
- The core window where you enter commands and run code.
- Executes commands immediately (interactive environment).
- Use it for quick calculations and testing small code snippets.



MATLAB®

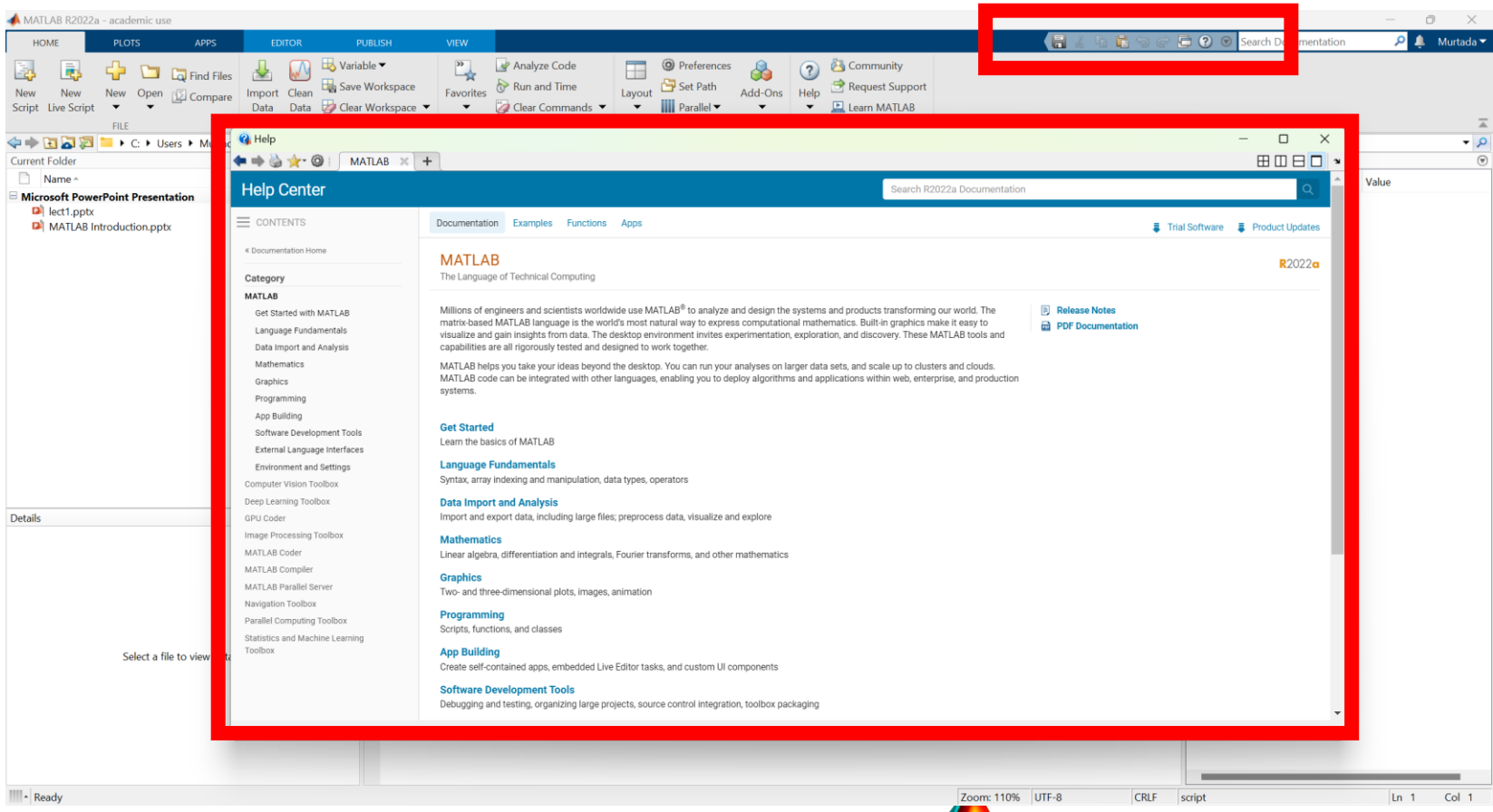
MATLAB Windows: Workspace

- Displays all variables currently in memory.
- Useful for tracking variable changes during a session.
- You can double-click a variable to view its details in the Variable Editor.



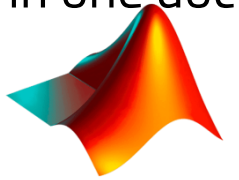
MATLAB Windows: Help Window

- Provides access to MATLAB's extensive documentation.
- Useful for finding information on functions, syntax, and toolboxes.
- You can type help function_name in the Command Window for function-specific help.



Files in MATLAB

- Script Files (.m):
  - MATLAB script files contain sequences of commands and code.
  - Useful for automating tasks and running multiple commands at once.
- Function Files (.m):
  - Function files define custom functions.
  - Begin with the function keyword and can accept inputs and outputs.
- MAT-Files (.mat):
  - Binary files used to store variables, arrays, and other data structures.
  - Saved using save command and loaded with load.
- Data Files:
  - MATLAB can read and write data from multiple formats such as:
    - CSV Files (.csv): Read with csvread and csvwrite.
    - Excel Files (.xls/.xlsx): Use xlsread and xlswrite.
    - Text Files (.txt): Use fopen, fwrite, fread, and fclose.
- Live Scripts (.mlx):
  - Interactive scripts that include text, equations, code, and output all in one document.
  - Useful for sharing results and documentation.



MATLAB®

Let’s try MATLAB

Install MATLAB and familiarise yourself with its interface.