Introducing ... Matlab!

Raymond J. Spiteri

Faculty of Computer Science
Department of Mathematics and Statistics
Dalhousie University

http://www.cs.dal.ca/spiteri
Outline

- What is Matlab?
Outline

- What is Matlab?
- Why Matlab?
- Getting Started
Outline

- What is Matlab?
- Why Matlab?
- Getting Started
- Basic Matlab Programming
What is Matlab?
What is Matlab?

Matlab = Matrix laboratory
What is Matlab?

- Matlab = Matrix laboratory
- problem-solving environment
What is Matlab?

- Matlab = Matrix laboratory
- problem-solving environment
- designed for convenient numerical computations, esp. matrix manipulation, but also DEs, stats, and graphics
What is Matlab?

- Matlab = Matrix laboratory
- problem-solving environment
- designed for convenient numerical computations, esp. matrix manipulation, but also DEs, stats, and graphics
- developed by Cleve Moler in 1970s as a teaching tool
What is Matlab?

- Matlab = Matrix laboratory
- problem-solving environment
- designed for convenient numerical computations, esp. matrix manipulation, but also DEs, stats, and graphics
- developed by Cleve Moler in 1970s as a teaching tool
- now ubiquitous in education and industry
What is Matlab?

originally FORTRAN; now C++/Java
What is Matlab?

- originally FORTRAN; now C++/Java
- can call external C/FORTRAN routines
What is Matlab?

- originally FORTRAN; now C++/Java
- can call external C/FORTRAN routines
- interpreted
What is Matlab?

- originally FORTRAN; now C++/Java
- can call external C/FORTRAN routines
- interpreted
- customized graphical-user-interface building
What is Matlab?

- originally FORTRAN; now C++/Java
- can call external C/FORTRAN routines
- interpreted
- customized graphical-user-interface building
- has many specialized functions (Toolboxes)
What is Matlab not?
What is Matlab not?

Free!
What is Matlab not?

- Free! Unless
- ... your school has a license
What is Matlab not?

- Free! Unless
- ... your school has a license
- ... you buy the Student Edition
What is Matlab not?

- Free! Unless
- ... your school has a license
- ... you buy the Student Edition
- ... you use contributed packages
  (e.g., finite element solver, linear matrix inequality solver, etc.)
What is Matlab not?

- Free! Unless
- ... your school has a license
- ... you buy the Student Edition
- ... you use contributed packages (e.g., finite element solver, linear matrix inequality solver, etc.)
- ... you use a free clone (e.g., octave, scilab, etc.)
What else is Matlab not?
What else is Matlab not?

- Fast!
What else is Matlab not?

- Fast! Unless...
- ...you use a Matlab compiler
What else is Matlab not?

- Fast! Unless
- ... you use a Matlab compiler
- ... you code things in an “optimized” fashion
Why Matlab?
Why Matlab?

- ease of use
Why Matlab?

- ease of use
- rapid prototyping/debugging of sophisticated code
Why Matlab?

- ease of use
- rapid prototyping/debugging of sophisticated code
- can be used interactively ("scratchpad") or from scripts
Consider the “old” way to solve a linear system $Ax = b$:

CALL DECOMP (NX, NX, A, IP, WORK, IPSD)
CALL SOLVE (NX, NX, A, B, X, 1, IP, WORK)
Why Matlab?

Consider the “old” way to solve a linear system $Ax = b$:

```
CALL DECOMP (NX, NX, A, IP, WORK, IPSD)
CALL SOLVE  (NX, NX, A, B, X, 1, IP, WORK)
```

In Matlab, this is as simple as

```
» x = A \ b;
```
Why Matlab?

Consider the “old” way to solve a linear system $Ax = b$:

CALL DECOMP (NX, NX, A, IP, WORK, IPSD)
CALL SOLVE (NX, NX, A, B, X, 1, IP, WORK)

In Matlab, this is as simple as

```matlab
» x = A \ b;
```

*Sensible numerical algorithms!*
Getting Started

other tutorials
Getting Started

- other tutorials
- help, lookfor
Getting Started

- other tutorials
- help, lookfor
- www.mathworks.com
Getting Started

- other tutorials
- help, lookfor
- www.mathworks.com
- other books (*Mastering Matlab 6*)