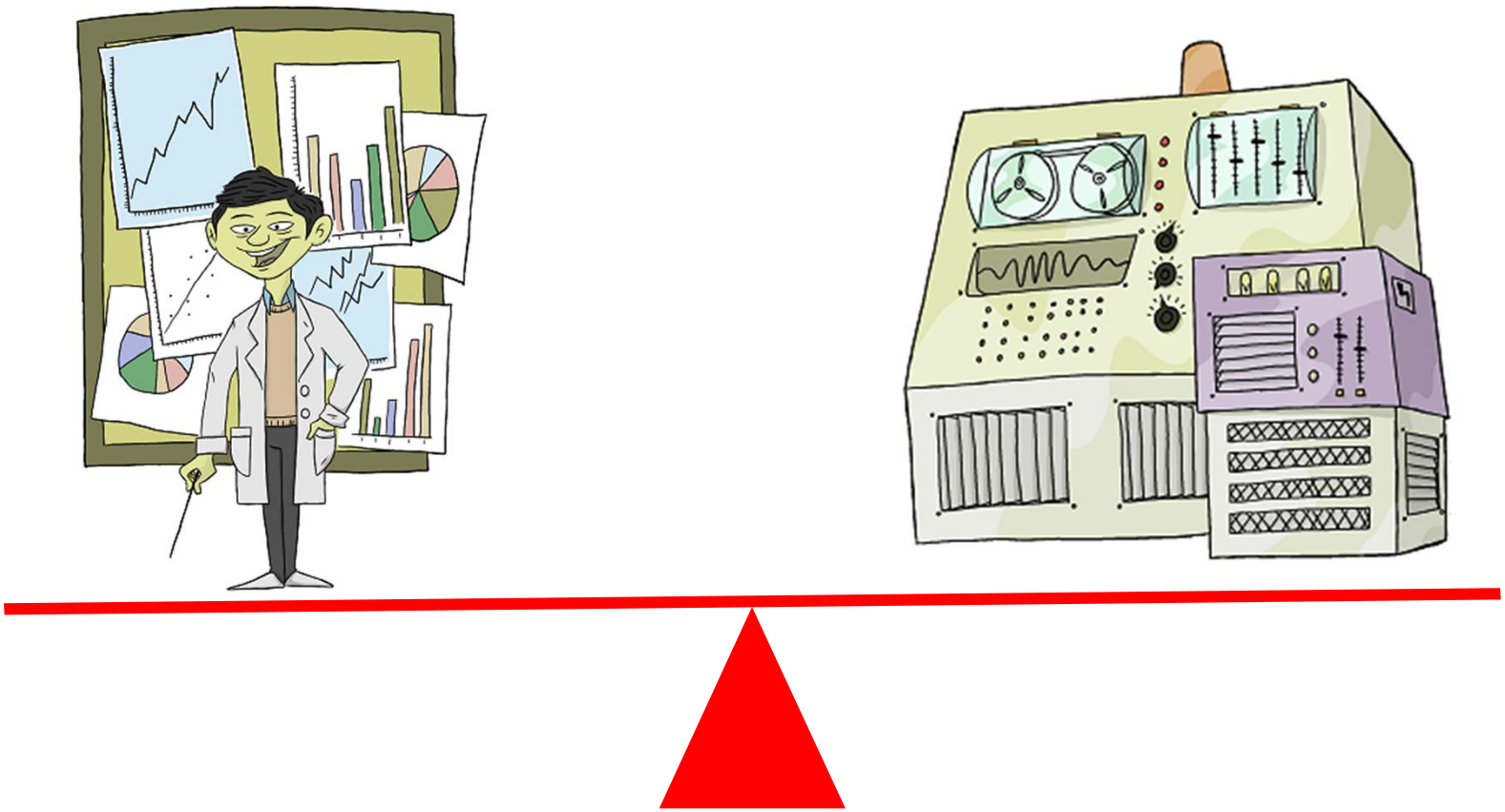
MATLAB Programming

Introduction

Good scientific software:

For whom is software written?



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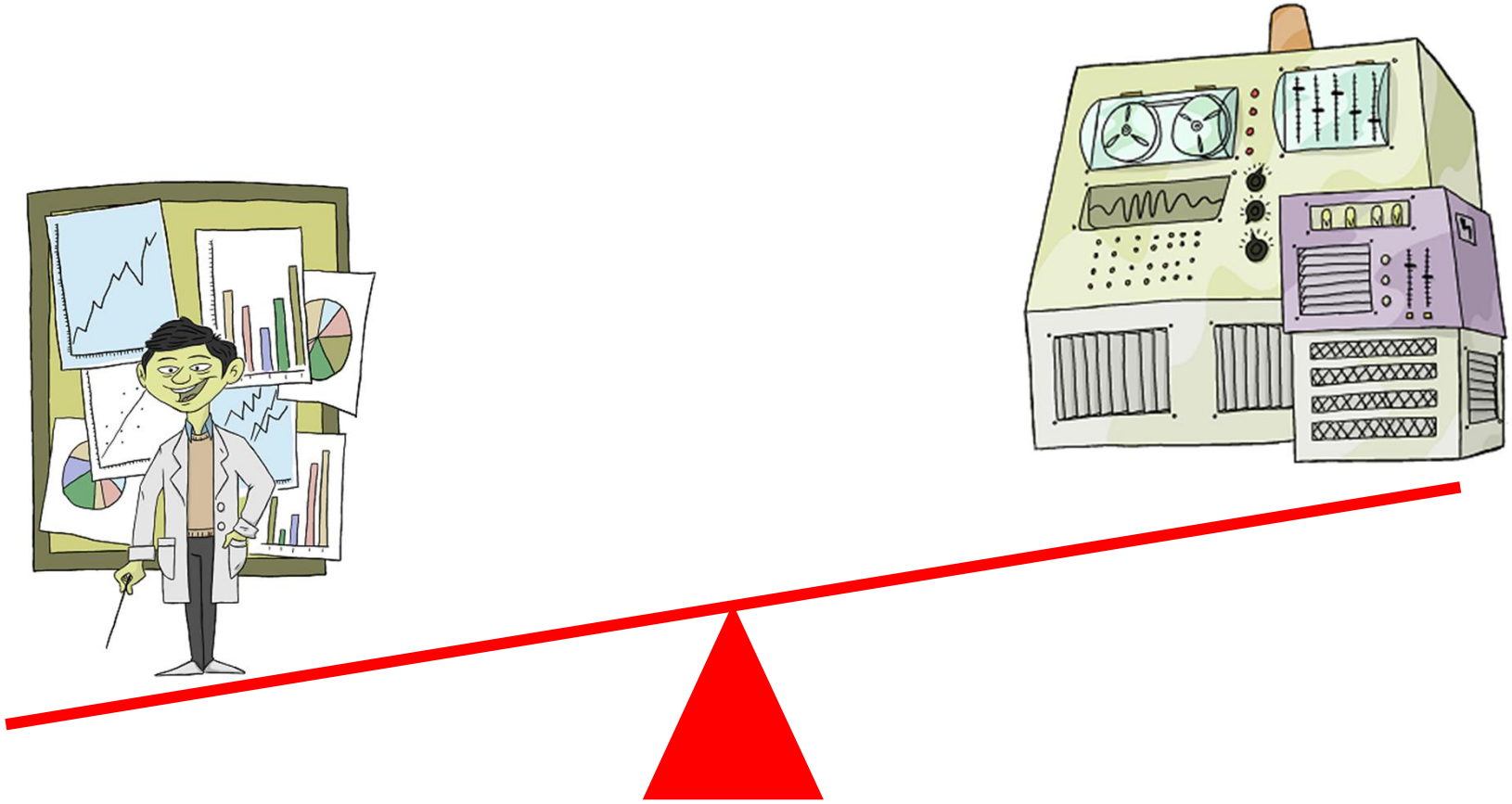

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é and then é

4) Efficient

Bad scientific software:

1) Emphasizes efficiency over readability

2) Emphasizes efficiency over testability

3) Reinvents the wheel

4) Couples domain specific knowledge with underlying mathematical routines.

Fast, wrong code gets you the wrong answeré faster.

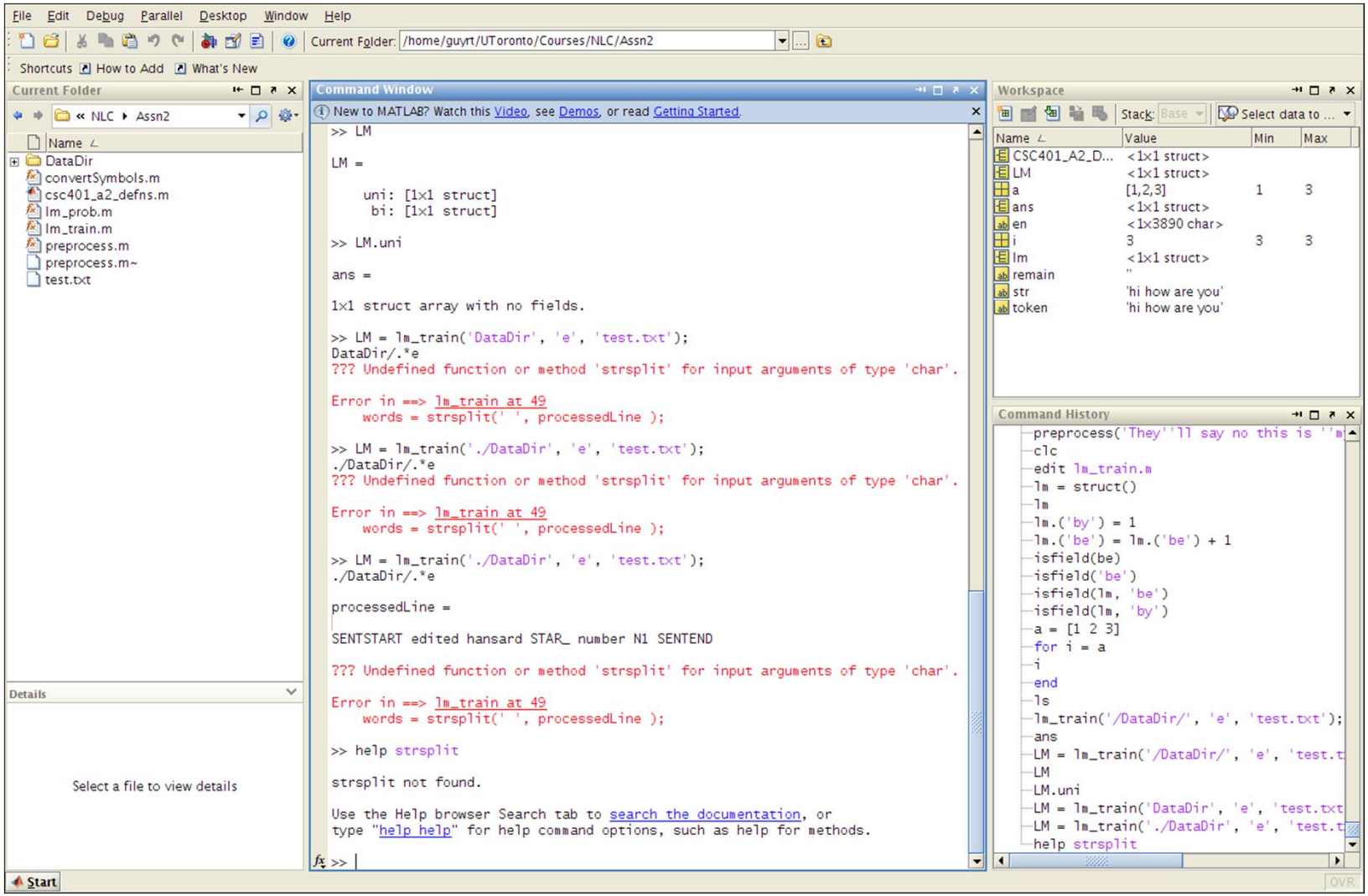
MATLAB is a é

- é programming languageé
- é and a programming environment.

Encourages

- Reuse of tested, efficient mathematical routines
- High level representation of programs
- Mathematical expression over details of algorithms.

MATLAB the environment



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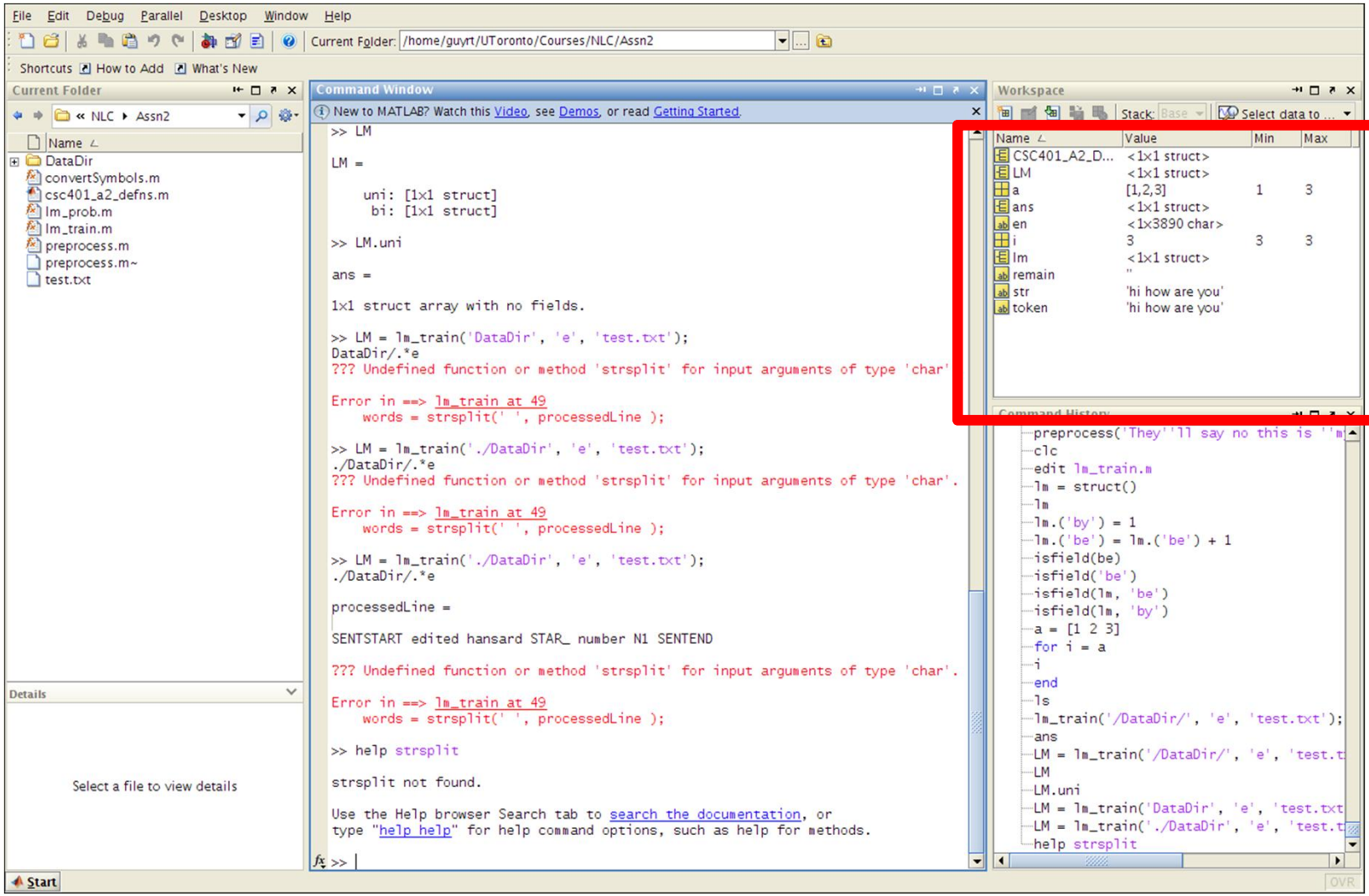

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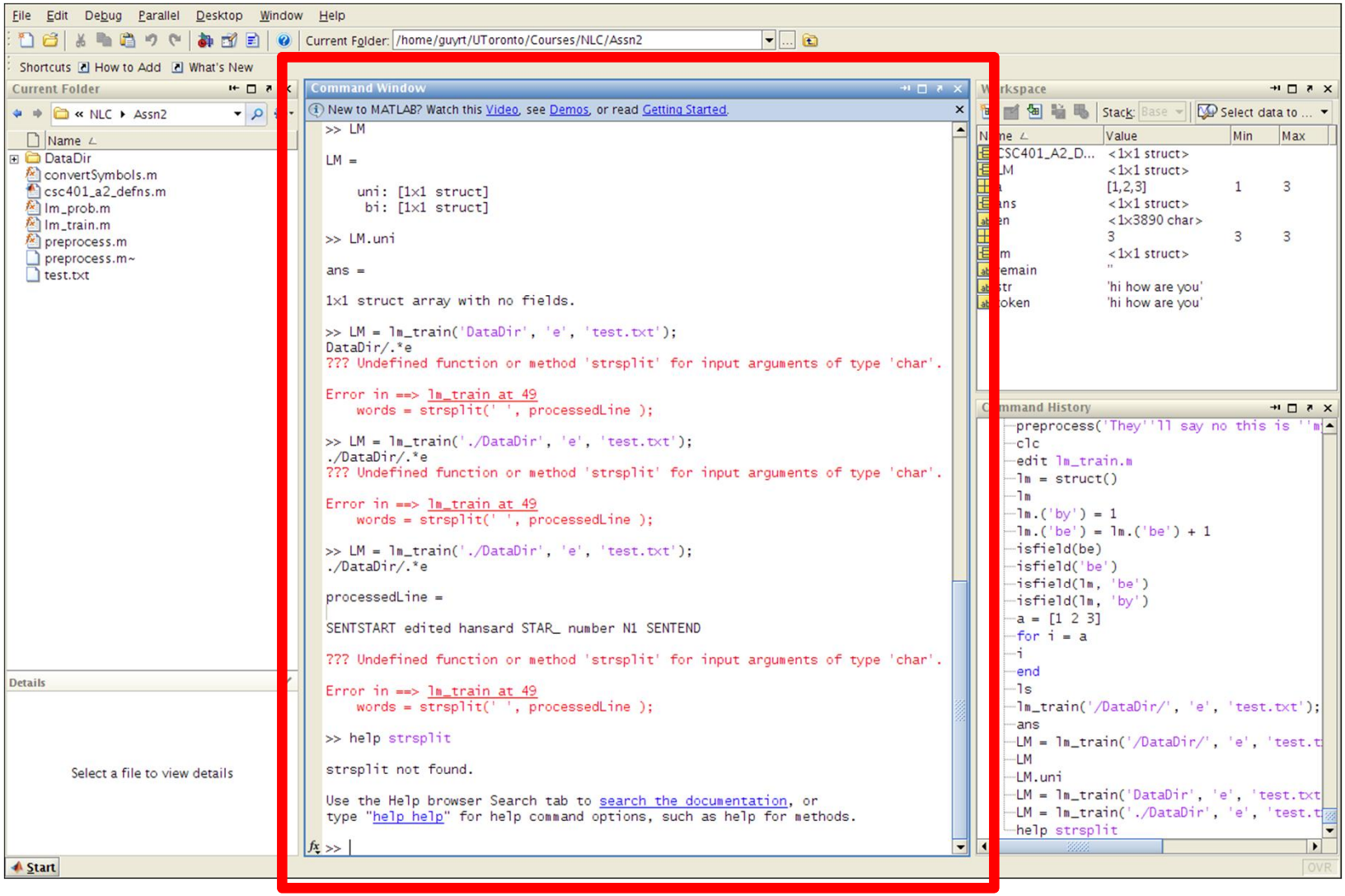

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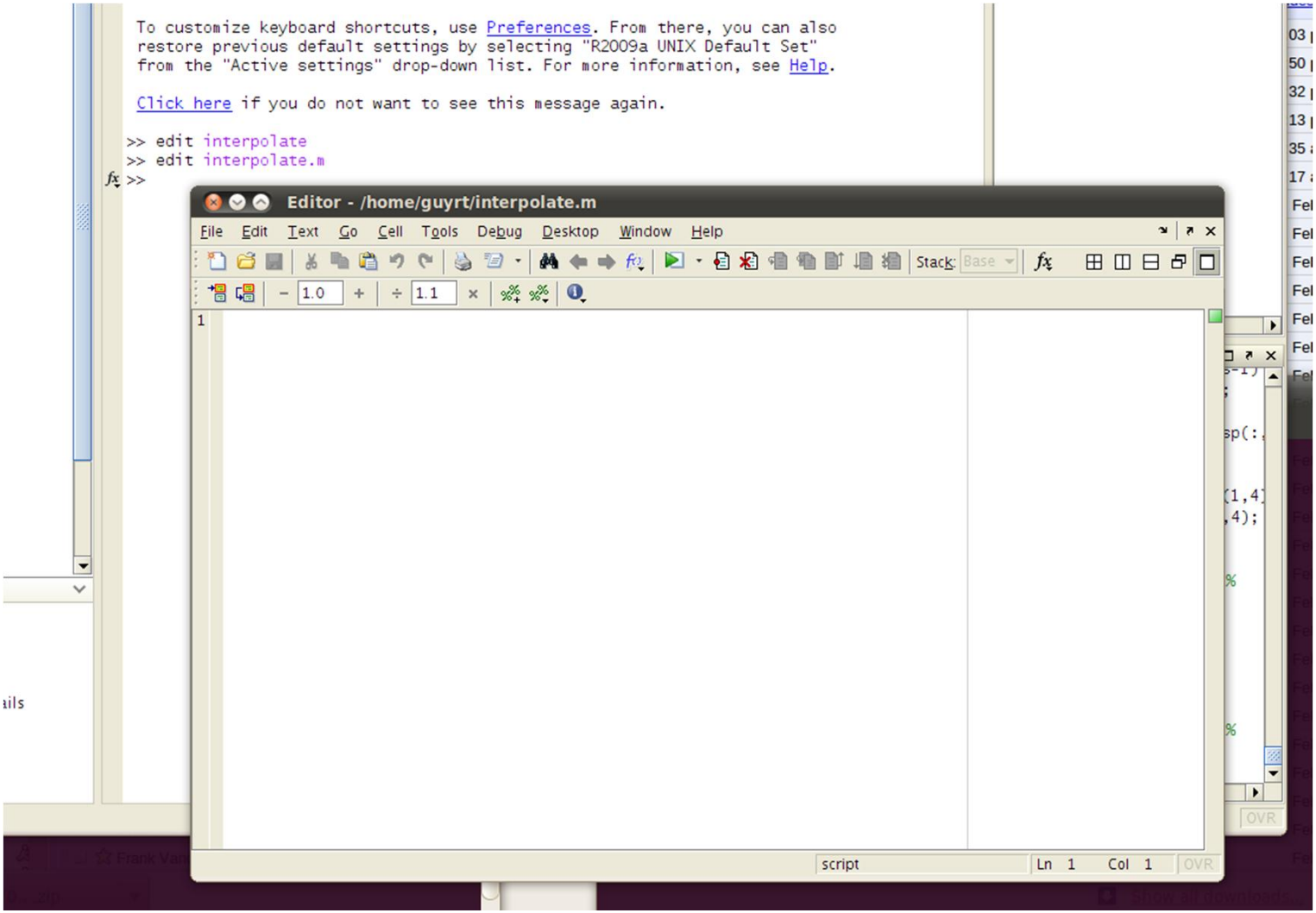

MATLAB as a programming language:

Arrays

```
>> nums = [1,2,3]
>> nums = nums + 4;
```

For loops

```
>> for i = nums:
>>     isprime(i);
```

Key idea: Data parallel programming

- The programmer works at level of mathematical ideasé
- é not loops and indices.

Most operators work on arrays directly.

Common theme: you probably* donôt want to use a loop

* (exceptions apply)

Example:

```
>> for i = 1:length(arr)
>>     arr(i) = arr(i) * 100;
>> end
```

Oré

```
>> arr = arr * 100;
```

Why learn MATLAB?

- Rapid prototyping
- Scales well to large, production problems.
- Thousands of mathematical routines
  - Tested
  - Efficient
- Common language in many fields

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February 2011