Introduction to Parallel Computing Toolbox™

Elwin Chan

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Who should use it?

• You!

• .... if you are a MATLAB or Simulink user

• .... if you have multiple cores in your computer

• .... if you have a GPU

• .... if you can access a cluster or grid

• Even if you have nothing!
Who else is using it?

**Optimizing JIT Steel Manufacturing Schedule**
Cut simulation time from 1 hour to 5 minutes

**Flight Test Data Analysis**
16x Faster

**Heart Transplant Studies**
3-4 weeks reduced to 5 days

**Mobile Communications Technology**
Simulation time reduced from weeks to hours, 5x more scenarios

**Hedge Fund Portfolio Management**
Simulation time reduced from 6 hours to 1.2 hours

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Running in the Cloud

MATLAB Parallel Cloud
Where did that actually run?
Using Local Workers
Where else can you use it?

- Ad Hoc Cluster
- Small Cluster
- Large Cluster
- Cloud
Task Oriented Problems
Data Oriented Problems
Programming Parallel Applications

- Built-in support with toolboxes: `UseParallel`
- Simple programming constructs: `parfor`, `parfeval`, `mapreduce`, `batch`, `distributed`
- Advanced programming constructs: `createJob`, `labSend`, `spmd`, `parallel.pool.Constant`
Programming Parallel Applications (GPU)

- Built-in support with toolboxes
- Simple programming constructs: ~400 mathematical functions, gpuArray, gather
- Advanced programming constructs: arrayfun, spmd
- Interface for experts: CUDAKernel, MEX support

Ease of Use ➔ Greater Control
Why use Parallel Computing Toolbox?

- Reduce computation time by
  - Using more cores
  - Accessing Graphical Processing Units

- Overcome memory limitations by
  - Distributing data to available hardware
  - Using MATLAB mapreduce

- Offload computations to a cluster and
  - Free up your desktop
  - Access better computer hardware