Introduction to Parallel Computing Toolbox™

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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
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

MATLAB Desktop (Client)

Worker

Worker

Worker

Time

Time
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

Ease of Use

Greater Control
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
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