



Course Title:

Accelerating and Parallelizing MATLAB Code

Course Purpose:

This course covers a variety of techniques for making your MATLAB® code run faster. You will identify and remove computational bottle-necks using techniques like preallocation and vectorization. On top of that, you will take advantage of multiple cores on your computer by parallelizing for-loops with Parallel Computing Toolbox™. If you are working with long-running simulations, you will benefit from the hands-on demonstrations and exercises in the course.

Topics include:

- Improving performance within core MATLAB
- Parallelizing computations
- Parallel for-Loops
- GPU computing

Pre- requisites:

MATLAB Fundamentals or equivalent experience using MATLAB.



- ✓ 2 training day
- ✓ Hours: 09:00-17:00
- ✓ Total training hours: 16

Teaching method

The course combines lectures, demonstrations and practical exercises in MATLAB, using original training books from MathWorks. The course is in Hebrew but the training materials are in English.

עמוד מס' 1

Training Center Systematics - Contact information:

Phone number: 03-7660111 Ext: 6 **Email:** training@systematics.co.il

Website: <http://www.systematics.co.il/mathworks>



Course Outline:

Improving Performance

Objective: Analyze code performance and utilize techniques for acceleration within MATLAB.

- Identifying bottle necks
- Preallocating arrays
- Vectorizing operations in various ways
- Rewriting algorithms

Generating MEX-Files

Objective: Generate compiled code files from MATLAB code for better performance.

- MATLAB Coder overview and workflow
- Generating and verifying MEX-files
- Calling unsupported functions
- Adjusting settings for MEX-file generation

Parallelizing Computations

Objective: Parallelize code execution to take advantage of multiple cores.

- Opening additional MATLAB processes
- Running parallel for-loops
- Measuring speedup
- Processing multiple files in parallel

עמוד מס' 2

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Parallel for-Loops

Objective: Explore parallel for-loops in more detail and apply techniques for converting for-loops to parfor-loops.

- Requirements of parallel for-loops
- Parallelizing for-loops
- Retrieving intermediate results

Offloading Execution

Objective: Offload computations to another MATLAB process in order to be able to use MATLAB for other tasks in the meantime. This is also a preparation step for working with clusters.

- Processing in batch
- Creating batch jobs
- Retrieving results
- Using the Job Monitor

Working with Clusters

Objective: Accelerate computations and realize more extensive simulations by utilizing multiple computers.

- Local and remote clusters
- Dynamic licensing
- Cluster discovery and connection
- File access considerations

GPU Computing

Objective: Execute MATLAB code on your computer's graphics card (GPU) as another option for speeding up calculations.

- Overview of GPU architecture and processing
- Applications suitable for GPU processing
- Invoking MATLAB functions on the GPU
- Using pre-existing CUDA code

עמוד מס' 3

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