

# Accelerating and Parallelizing MATLAB Code

## Prerequisites

*MATLAB Fundamentals*, or equivalent experience using MATLAB

Day 1 of 2	
<b>Improving Performance</b>	<p><b>Objective:</b> Analyze code performance and utilize techniques for acceleration within MATLAB.</p> <ul style="list-style-type: none"><li>Identifying bottle necks</li><li>Preallocating arrays</li><li>Vectorizing operations in various ways</li><li>Rewriting algorithms</li></ul>
<b>Generating MEX-Files</b>	<p><b>Objective:</b> Generate compiled code files from MATLAB code for better performance.</p> <ul style="list-style-type: none"><li>MATLAB Coder overview and workflow</li><li>Generating and verifying MEX-files</li><li>Calling unsupported functions</li><li>Adjusting settings for MEX-file generation</li></ul>
<b>Parallelizing Computations</b>	<p><b>Objective:</b> Parallelize code execution to take advantage of multiple cores.</p> <ul style="list-style-type: none"><li>Opening additional MATLAB processes</li><li>Running parallel for-loops</li><li>Measuring speedup</li><li>Processing multiple files in parallel</li></ul>

Day 2 of 2	
<b>Parallel for-Loops</b>	<p><b>Objective:</b> Explore parallel for-loops in more detail and apply techniques for converting for-loops to parfor-loops.</p> <ul style="list-style-type: none"><li>Requirements of parallel for-loops</li><li>Parallelizing for-loops</li><li>Retrieving intermediate results</li></ul>
<b>Offloading Execution</b>	<p><b>Objective:</b> 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.</p> <ul style="list-style-type: none"><li>Processing in batch</li><li>Creating batch jobs</li><li>Retrieving results</li><li>Using the Job Monitor</li></ul>

<b>Working with Clusters</b>	<p><b>Objective:</b> Accelerate computations and realize more extensive simulations by utilizing multiple computers.</p> <ul style="list-style-type: none"><li>Local and remote clusters</li><li>Dynamic licensing</li><li>Cluster discovery and connection</li><li>File access considerations</li></ul>
<b>GPU Computing</b>	<p><b>Objective:</b> Execute MATLAB code on your computer's graphics card (GPU) as another option for speeding up calculations.</p> <ul style="list-style-type: none"><li>Overview of GPU architecture and processing</li><li>Applications suitable for GPU processing</li><li>Invoking MATLAB functions on the GPU</li><li>Generating CUDA<sup>®</sup> MEX files using GPU Coder<sup>™</sup></li><li>Using pre-existing CUDA code</li></ul>