

## Running MetroLER on Multiple Cores

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MetroLER has the ability to make use of multiple microprocessor cores. On the *Options* tab, the user can select the number of processors to use simultaneously (in parallel) when batch processing images. The total number of processors available includes both physical cores and virtual cores. Most Intel microprocessors have one additional virtual core for each physical core, so that the number of available processors (also called threads) is generally twice the number of physical cores. These threads share memory and other processor functions, so running two threads on one physical core is not twice as fast as running one. By default, MetroLER uses all but one of the threads.

To test the speed improvements that come with using multiple cores, the following computers were tested.

### Computer #1:

Computer Processor: Intel i9-9900K @ 3.6 GHz (8 physical cores, 16 threads)

Memory (RAM): 64 GB

OS: Windows 10, 64-bit operating system

### Computer #2:

Computer Processor: Intel i7-4770 @ 3.4 GHz (4 physical cores, 8 threads)

Memory (RAM): 32 GB

OS: Windows 10, 64-bit operating system

### Computer #3:

Computer Processor: Intel Xeon W-2145 @ 3.7 GHz (8 physical cores, 16 threads)

Memory (RAM): 16 GB

OS: Windows 10, 64-bit operating system

MetroLER v2.0.5 was used to analyze line/space images that were 1024x1024 pixels and contained 20 lines per image. Default MetroLER parameters were used. The results in the graph below show that the physical cores are very effective at running in parallel and thus speeding up the analysis of multiple images. Setting MetroLER to use 4 cores results in a 3.5x speedup for each of the three computers, so that each core is about 88% effective. For the two computers with 8 physical cores, setting MetroLER to use 8 processors gives a 5.7x speed up (71% efficiency per core). Each virtual core, however, is much less efficient (about 15%). The computers with 8 physical cores were 6.4 – 6.8x faster when set to use 16 processors.

