### Partner:
DarwinAI is a cutting-edge Artificial Intelligence startup based in Waterloo, Ontario, Canada. Their Generative Synthesis technology uses AI itself to understand a neural network and then learns to generate a number of new and highly optimized networks tailored to specific needs and requirements. Essentially, it uses ‘AI to build AI.’

### Challenge:
Building a computationally efficient network which can infer much faster while maintaining the functional accuracy. A detailed understanding of the target hardware is critical in maintaining their competitive advantage.

### Solution:
Performance gains for ISV’s generated neural networks, including computer vision networks ResNet50 were achieved using Intel® Math Kernel Library and OpenMP* tuning, coupled with multi-inferencing, running multiple instances in parallel and scaling the number of threads available per process. Thus resulting in smaller, high-performance networks that are also explainable.

#### Performance gains of up to 7.6x for EdgeSpeech, up to 9.6x on NASNet, and up to 16.3x on ResNet50.

**Solution Brief:**

Configuration:
- **NEW:** Tested by Intel as of 05/19/2019. 2 socket Intel® Xeon® Platinum 8153 Processor, 16 cores per socket, Ucode 0x200004d, HT On, Turbo On, OS Ubuntu 18.04.2 LTS, Kernel 4.15.0-46-generic, Total Memory 376 GB (12 slots/ 32GB/ 2666 MHz), BIOS SE5C620.86B.00.01.0015.110720180833, Deep Learning Framework: TensorFlow 1.13.1 (conda tensorflow-mkl), custom test data, tested using batches of 32 and 50, for NASNet and ResNet respectively, and n/a for EdgeSpeech (all optimized for latency), streams: 30 for all cases.
- **BASELINE:** Tested by Intel as of 05/19/2019. 2 socket Intel® Xeon® Platinum 8153 Processor, 16 cores per socket, Ucode 0x200004d, HT On, Turbo On, OS Ubuntu 18.04.2 LTS, Kernel 4.15.0-46-generic, Total Memory 376 GB (12 slots/ 32GB/ 2666 MHz), BIOS SE5C620.86B.00.01.0015.110720180833, Deep Learning Framework: TensorFlow 1.13.1 (conda tensorflow-mkl), custom test data, tested using batches of 32 and 50, for NASNet and ResNet respectively, and n/a for EdgeSpeech, streams: 1 in all cases.

Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations, and functions. Any change to any of those factors may cause the results to vary. For more complete information visit http://www.intel.com/performance. Performance results are based on testing as of May 2019 and may not reflect all publicly available security updates.