






October 2018 Newsletter

Highlights

 <p>Optimization Techniques</p>	<p><u>Multi-scale CNN Training with High Content Cellular Imaging on Intel® Xeon® Scalable Processors</u>: Reducing training time to minutes using large batch sizes by exploiting sizable memory.</p> <p><u>Optimizing Iso3DFD with Intel® Advisor & Intel® VTune™ Amplifier</u>: Demonstrate how Intel VTune™ Amplifier and Intel Advisor can diagnose issues with memory access.</p> <p><u>Accelerating WRF Physics Codes on Intel Micro-architectures</u>: Leveraging portability of OpenMP, using thread-locality (SOA) and identifying chunk size to maximize work per thread and locality.</p> <p><u>Optimization TensorFlow* Serving Application on Intel® Xeon® Scalable Processors</u>: Used Intel® Math Kernel Library for Deep Neural Networks (Intel® MKL-DNN) for acceleration.</p> <p><u>Optimization Strategy for MASNUM Surface Wave Model</u>: Defining the hotspots, using Intel® VTune™ Amplifier, ensure proper load balance using Intel® Trace Analyzer & Collector, improving memory access efficiency, etc.</p> <p><u>Analyzing OpenMP & Threading Building Blocks Task Graphs</u>: exploring task based parallel programming, tasking with dependencies, leveraging Intel® Advisors – Flow Graph Analyzer (supports OpenMP task with dependencies).</p>
	<p><u>Distributed Training of Generative Adversarial Networks for Fast Detector Simulation</u>: Distributed training to scale by allowing meta-optimization, hyper parameter scans to generalize different detectors to parallelize training process and optimize scaling on clusters.</p>

<p>Case Studies</p>	<p><u>Machine Learning Framework for Large-Scale Weather and Climate Prediction using Exact and Approximate Linear Algebra Computation</u>: Reducing prohibitive complexity of dense covariance matrix computation by predict missing measurements, target various hardware to leverage shared and distributed-memory to perform broader scientific experiments.</p> <p><u>Efficient Neural Network Training on Supercomputers</u>: Artificial Intelligence usages and performance drivers to deliver efficient scaling of neural network training on supercomputers using a radiologist trained on Intel® Xeon® Scalable Processors case study.</p> <p><u>Improving Oil & Gas Extraction Simulation Performance</u>: addressing the memory access pattern to improve data locality, exploiting SIMD for floating-point computations and optimizing memory affinity of a wave propagation model provided by Petrobras.</p> <p><u>OpenMP for Reconfigurable Heterogeneous Architectures</u>: demonstrating the use of Intel® FPGA in an HPC context, addressing slow clocks and engineering time with parallelism and high-level synthesis, with workarounds for logging undocumented LLVM calls, etc.</p> <p><u>How Intel® FPGAs Accelerate Financial Services Workloads</u>: insights to the Financial Services Industry on the importance of using Intel® FPGAs to tackle performance, power, size, latency, jitter and inline processing.</p>
<p> Scientific Breakthrough</p>	<p><u>SPARTA Heterogeneous Full Trinity Runs: Successes and Challenges</u>: Sandia National Laboratories sharing examples of talking full-system runs on the Trinity system. Addressing the use of more memory, system hardening and its resilience, on large scale computing initiatives.</p> <p><u>New Compute Frontier = HPC + Artificial Intelligence (AI)</u>: exploring the opportunities and challenges of combining HPC and AI, combining HPC and Machine Learning, and determining diverse architectural approaches.</p> <p><u>Intel® AI Interplanetary Challenge Winner: Using AI for Earth-Wide Plant, Deforestation Database</u>: Advancement of space exploration by building models with three different classifiers (location, plant, and deforestation) using Intel® Optimization of TensorFlow* with accuracy. Images to be made available for further analysis of population growth, urbanization, migration patterns and others.</p> <p><u>Turning Frozen Biomolecules into High-Speed Science</u>: Cryo-Electron Microscopy (Cryo-EM, garnered the 2017 Nobel Prize in Chemistry) and Molecular Dynamics help researchers visualize and understand cellular processes at the molecular level. Modernization efforts resulted in improving image reconstruction, efficient scaling of RELION on HPC systems to fully empower cryo-EM researchers.</p>

Testing Your Code on Intel® Architecture

Hardware Access: We encourage testing applications using various configurations of Intel® architecture (Intel® Xeon Scalable processors, Intel® Omni-Path, etc. Click [HERE](#) to test your optimized application at scale using TACC, Stampede II system. Upon requesting access, create a new account (do not click on PI-eligible) and follow the email instructions. Then email the ipcc.program.office@intel.com account and include your username in the communication.

***New Software: Intel® Parallel Studio XE 2019:** new features that include high performance Python* innovations, intuitive Intel® VTune™ Amplifier interface, visualization capabilities with Intel® Advisor's Flow Graph Analyzer, next-gen Intel® MPI Library for preparing HPC solutions for Exascale, and more.

Global Training Opportunities

We encourage you to participate in any of the upcoming global training opportunities.

Date	Location	Event
October 14-16, 2018	Qingdao, China	2018 National Annual Conf. on HPC
October 14-19, 2018	Anaheim, California	Society of Exploration Geophysicists Annual Meeting 2018
October 18-20, 2018	Qingdao, PRC	HPC China 2018
October 21-26, 2018	Berlin, German	VIS 2018
November 2-4, 2018	Nanjing, PRC	MLA'18: 16th China Symposium on Machine Learning & Apps
November 11, 2018	Dallas, Texas	Intel® HPC Forum
November 12-14, 2018	Dallas, Texas	SC'18 Intel Associated Activities
November 12-14, 2018	Milano, Italy	Introduction to Parallel Computing with MPI and OpenMP
November 14-16, 2018	Beijing, PRC	Asian Conference on Machine Learning
December 3-8, 2018	Montreal, Canada	Neural Information Processing Systems (NIPS) Conf. 2018
February 27- March 2, 2019	Minneapolis, USA	SIGCSE 2019
March 12-15, 2019	Warsaw, Poland	Supercomputing Frontiers Europe 2019
June 16-20, 2019	Frankfurt, Germany	ISC 2019

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