

Intel Unveils New Technologies to Accelerate Innovation in a Data-Centric World

Next-Generation Intel Xeon Scalable Processors, Intel Optane DC Persistent Memory, Intel SSDs, Intel Agilex FPGAs and Ethernet Technologies Enable the Accelerated Movement, Storage and Processing of the World's Data

SANTA CLARA, Calif., Apr. 2, 2019 – At Intel's "Data-Centric Innovation Day," the company revealed next-generation processors and platform technologies to unleash the impact of data for customers across the globe. Today's announcements reflect Intel's unmatched product portfolio to move, store and process data across the most demanding workloads, from the intelligent edge to multi-cloud and back.

Intel Xeon Processors

2nd-Gen Intel® Xeon® Scalable Processors – A Foundation for Data-Centric Transformation

The 2nd-Gen Intel Xeon Scalable platform provides the foundation for a powerful data center platform that creates an evolutionary leap in agility and scalability. Enterprises, cloud and communications service providers can drive forward their most ambitious digital initiatives with a feature-rich, versatile platform.

Intel Xeon Scalable processors deliver many new capabilities, including:

- Support for Intel's breakthrough Intel® Optane™ DC persistent memory, delivering up-to 36TB of system-level memory capacity when combined with traditional DRAM.
- Intel® Turbo Boost Technology 2.0 ramps up-to 4.4GHz, alongside memory subsystem enhancements with support for DDR4-2933 MT/s and 16 Gb DIMM densities.
- Built-in Intel® Deep Learning Boost delivers up to 14x² inference throughput improvement, and combined with software optimized Intel® Distribution of OpenVINO™ toolkit Intel is accelerating the momentum of expanding artificial intelligence (AI) possibilities at the edge and inside the data center.¹
- Intel® Speed Select Technology provides enterprise and infrastructure-as-a-service providers more flexibility to address evolving workload needs. Intel's new Xeon Scalable processors can be configured to performance settings of core counts and frequencies, effectively creating "Three CPUs in One."
- Enhanced Intel® Infrastructure Management Technologies to enable increased utilization and workload optimization across data center resources.
- As part of Intel's ongoing commitment to protect customers and their data, new side-channel protections are directly incorporated into hardware with the introduction of the 2nd-Gen Intel Xeon Scalable processors.

Intel® Xeon® Platinum 9200 processor – A New Class of Leadership Performance

The Xeon Scalable Platinum 9200 processor is designed for high-performance computing (HPC), advanced analytics, artificial intelligence and high-density infrastructures. The new Intel Xeon Platinum 9200 processors feature up to 56 cores and 12 memory channels to deliver breakthrough levels of performance with the highest Intel architecture FLOPS per rack, along with the highest DDR4 native memory bandwidth support of any Intel Xeon processor platform.

Additional Xeon Processors

- **Intel Xeon Platinum Processor (8200 Series)**
 - Best performance, business agility, hardware-enhanced security and built-in AI.
 - Up to 28 cores and 2, 4 and 8+ socket configurations.
 - Top memory bandwidth and a third UPI link for increased I/O bandwidth.
- **Intel Xeon Gold Processor (6200 Series)**
 - Networking Specialized (NFVi optimized) SKUs with Intel Speed Select Technology – Base Frequency.
 - Up to 1.76x NFV workload perf improvement and additional flexibility to enable up to 8 high-priority cores that support virtualized workload acceleration for maximum performance and power efficiency.
 - Up to 24 cores (6552 SKU)
- **Intel Xeon Gold Processor (5200 Series)**
 - Networking Specialized (NFVi optimized) SKUs with Intel Speed Select Technology – Base Frequency.
 - Up to 1.76x NFV workload perf improvement and additional flexibility to enable 4 high priority cores that support virtualized workload acceleration for maximum performance and power efficiency.
 - Up to 18 cores.
- **Intel Xeon Silver Processor (4200 Series)**
 - Efficient performance at low power and built-in AI.
 - Up to 12 cores and as low as 70W TDP with improved memory channel performance.
 - Intel Turbo Boost Technology and Intel® Hyper-Threading technology.
- **Intel Xeon Bronze Processor (3200 Series)**
 - Entry-level performance and built-in AI.
 - The 3100 series provides a reliable upgrade over Intel Xeon E processors and is intended for small and medium businesses.
 - Up to 8 cores.

Workstation

Delivering the powerful performance and ultimate scalability that advanced workstation professionals demand, the 2nd-Gen Intel Xeon Scalable processors for workstations are optimized for purpose-built platforms designed for heavily threaded, I/O intensive workloads

across market segments such as architecture, engineering, construction (AEC), media and entertainment, artificial intelligence, oil and gas, and life sciences.

Intel® Security Libraries for Data Center

Released in conjunction with 2nd-Gen Intel Xeon Scalable processors, Intel Security Libraries for Data Center (Intel® SecL-DC) is designed to simplify the integration and deployment of hardware-rooted Intel security technologies at cloud scale. Intel SecL-DC brings optimized programming interfaces and management tools for many Intel security technologies together in one easy-to-use set of libraries and tools compatible with cloud environments like OpenStack*, Docker* and Kubernetes* Extensions. Intel SecL-DC strengthens Intel's commitment to protect data throughout its lifecycle – at rest, in flight and in use.

Intel® Select Solutions

Intel enhanced its 2019 portfolio of [Intel Select Solutions](#) to simplify and accelerate customer deployment of workload-optimized infrastructure and faster time to value. The portfolio features nine new or updated solutions configurations available today and six additional configurations coming soon to market. The configurations are optimized to take full advantage of the latest data-centric product enhancements, plus updates of existing configurations that utilize 2nd-Gen Intel Xeon Scalable processors. With these additions, Intel will offer a total of 21 Intel Select Solutions.

Highlights of the Intel Select Solution portfolio launched today include new solutions for SAP HANA, Visual Cloud Delivery Networks, AI Inferencing, and HPC and AI Converged Clusters, as well as updated solutions for foundational workloads such as Microsoft SQL Server*, NFVi*, VMware vSAN* and Microsoft Azure Stack HCI*. Intel has more than 35 partners currently offering solutions or that plan to build, verify and sell new 2nd-Gen Intel Xeon Scalable processor-based solutions in the future.

Security Innovation Spotlight: Intel Select Solution for Hardened Security with Lockheed Martin

For security-sensitive organizations, Intel engineers have worked with Lockheed Martin*, a world leader in security, to deliver a new hardened virtualization platform. This Intel Select Solution for Hardened Security with Lockheed Martin is a full-stack solution, from hardware through hypervisor. It features:

- Greater data confidentiality through VM memory encryption and cache isolation.
- Robust platform integrity with trusted boot all the way through to runtime.
- And Improved availability through more deterministic Quality of Service and protections from Noisy Neighbors, whether malicious or not.

Together, this delivers a benchmarked and optimized platform, which removes guess work and streamlines time to deployment.

Edge-Computing SoCs

Intel® Xeon® D-1600 processors – High-Density SoC Processors for Intelligent Edge

Intel Xeon D-1600 processors are highly integrated SoC processors designed for dense environments where power and space are limited, but per-core performance is essential. Combined with built-in Intel® QuickAssist technology and Intel® Virtualization technology, Intel Xeon D-1600 processors deliver new levels of workload-optimized performance and hardware-enhanced security benefits for virtualized network functions (VNFs), control plane and mid-range storage solutions. Intel Xeon D-1600 processors feature up to 8 cores.

Intel® Agilex™ FPGAs – The FPGA for the Data-Centric World

Intel® Agilex™ FPGAs enable transformative applications and flexible hardware acceleration for edge computing, embedded, networking (5G/NFV) and data centers. Intel Agilex FPGAs are the first FPGAs designed to take full advantage of Intel's unmatched innovation including:

- 10nm process technology
- Transceiver data rates up to 112Gbps
- PCIe* Gen 5 interface support
- Intel® eASIC™ devices One API
- Intel® Optane™ DC Persistent Memory support
- Compute Express Link, a cache and memory coherent interconnect to future Intel Xeon Scalable processors.

The Intel Agilex FPGAs utilize Intel's heterogeneous 3D packaging technology, which provides FPGAs with application-specific optimization and customization, delivering new levels of flexibility and agility.

Intel Optane DC Memory and Storage

With breakthrough performance levels in memory-intensive workloads, virtual machine density and fast storage capacity, Intel® Optane™ DC persistent memory – combined with 2nd-Gen Intel Xeon Scalable processors – accelerates IT transformation to support the demands of the data era, with faster-than-ever analytics, cloud services, virtualization and next-generation communication services.

Intel Optane DC Persistent Memory – Breakthrough Memory and Storage

Intel Optane DC persistent memory provides a new foundation for data center performance, delivering up to 36TB of system-level memory capacity when combined with traditional DRAM. Intel Optane DC persistent memory allows customers to transform critical data workloads – from cloud and databases to in-memory analytics and content delivery networks.

- A system restart reduction from minutes to seconds
- Up to 36 percent more virtual machines
- Up to 2x system memory capacity; up to 36TB in an eight-socket system

Intel® Optane™ DC SSD D4800X – A High Availability Path to Data

The dual-port Intel Optane DC SSD D4800X (NVMe) offers a “24x7” available data path and super-fast storage, breaking through bottlenecks to increase the value of stored data in mission-critical environments. The Intel Optane SSD DC D4800X delivers 9x faster read latency compared to NAND dual port, under write pressure.

Intel® QLC 3D NAND SSD D5-P4326 – Enabling 1PB of storage in 1U design

The Intel® SSD D5-P4326 (QLC 3D NAND) is an addition to the industry’s first-to-market PCIe QLC SSDs and available on the industry’s first EDSFF compliant drive. The drive and innovative “ruler” form factor delivers massive, cost-effective capacity SSDs to enable HDD and TLC SSD replacement in warm storage. Using QLC in warm storage delivers storage consolidation and cost savings across content-delivery networks, data lakes, scale-out storage and large media stores.

Learn [about Intel's storage innovations](#) and how the company is [driving data-centric transformation](#). More information on Intel® 3D NAND technology can be found on [Intel.com](#).

Connectivity Solutions

To address the growing demand for data generation and consumption, Intel is introducing a complete series of new, highly innovative next-generation Ethernet products that connect servers and storage to move data faster.

Intel® Ethernet 800 Series – Intel's Next-Generation Ethernet Controller

The [Intel Ethernet](#) 800 Series controllers and adapters, in production in 2019’s third quarter, are capable of supporting speeds of up to 100 Gbps, which is 4x to 10x more server network bandwidth than many companies have deployed today. The new Ethernet series provides breakthrough capabilities including Application Device Queues (ADQ), which improves application performance and consistency in meeting service-level agreements (SLAs). ADQ delivers greater than 50 percent increase in application response time predictability³, more than 45 percent lower latency⁴, and more than 30 percent improved throughput⁵ running open source Redis*, a widely used database among cloud service providers. Other advanced capabilities include enhanced Dynamic Device Personalization (DDP) to improve packet processing efficiency and enable new services, and faster processing of latency sensitive workloads with support of both iWARP and RoCE v2 Remote Direct Memory Access (RDMA).

About Intel

Intel (NASDAQ: INTC), a leader in the semiconductor industry, is shaping the data-centric future with computing and communications technology that is the foundation of the world's innovations. The company's engineering expertise is helping address the world's greatest challenges as well as helping secure, power and connect billions of devices and the infrastructure of the smart, connected world – from the cloud to the network to the edge and everything in between. Find more information about Intel at newsroom.intel.com and intel.com.

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Application Device Queues (ADQ)

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. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more complete information visit <http://www.intel.com/performance>.

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at intel.com.

Cost reduction scenarios described are intended as examples of how a given Intel- based product, in the specified circumstances and configurations, may affect future costs and provide cost savings. Circumstances will vary. Intel does not guarantee any costs or cost reduction.

Optimization Notice: Intel's compilers may or may not optimize to the same degree for non-Intel microprocessors for optimizations that are not unique to Intel microprocessors. These optimizations include SSE2, SSE3, and SSSE3 instruction sets and other optimizations. Intel does not guarantee the availability, functionality, or effectiveness of any optimization on microprocessors not manufactured by Intel. Microprocessor-dependent optimizations in this product are intended for use with Intel microprocessors. Certain optimizations not specific to Intel microarchitecture are reserved for Intel microprocessors. Please refer to the applicable product User and Reference Guides for more information regarding the specific instruction sets covered by this notice. Notice Revision #20110804

1. 14x was CLX-SP with Intel DL Boost using int8 data type versus SKL-SP using FP32 data type at launch (July'17).
2. **Up to 14x AI Performance Improvement with Intel® DL Boost** compared to Intel® Xeon® Platinum 8180 Processor when launched (July 2017). Tested by Intel as of 2/20/2019. 2 socket Intel® Xeon® Platinum 8280 Processor, 28 cores HT On Turbo ON Total Memory 384 GB (12 slots/ 32GB/ 2933 MHz), BIOS: SE5C620.86B.0D.01.0271.120720180605 (ucode: 0x200004d), Ubuntu 18.04.1 LTS, kernel 4.15.0-45-generic, SSD 1x sda INTEL SSDSC2BA80 SSD 745.2GB, nvme1n1 INTEL SSDPE2KX040T7 SSD 3.7TB, Deep Learning Framework: Intel® Optimization for Caffe version: 1.1.3 (commit hash: 7010334f159da247db3fe3a9d96a3116ca06b09a), ICC version 18.0.1, MKL DNN version: v0.17 (commit hash: 830a10059a018cd2634d94195140cf2d8790a75a, model: https://github.com/intel/caffe/blob/master/models/intel_optimized_models/int8/resnet50_int8_full_conv.prototxt, BS=64, DummyData, 4 instance/2 socket, Datatype: INT8 vs Tested by Intel as of July 11th 2017: 2S Intel® Xeon® Platinum 8180 CPU @ 2.50GHz (28 cores), HT disabled, turbo disabled, scaling governor set to "performance" via intel_pstate driver, 384GB DDR4-2666 ECC RAM. CentOS Linux release 7.3.1611 (Core), Linux kernel 3.10.0-514.10.2.el7.x86_64. SSD: Intel® SSD DC S3700 Series (800GB, 2.5in SATA 6Gb/s, 25nm, MLC). **Performance measured with:** Environment variables: KMP_AFFINITY='granularity=fine, compact', OMP_NUM_THREADS=56, CPU Freq set with cpupower frequency-set -d 2.5G -u 3.8G -g performance. Caffe: (<http://github.com/intel/caffe/>), revision f96b759f71b2281835f690af267158b82b150b5c. Inference measured with "caffe time --forward_only" command, training measured with "caffe time" command. For "ConvNet" topologies, dummy dataset was used. For other topologies, data was stored on local storage and cached in memory before training. Topology specs from https://github.com/intel/caffe/tree/master/models/intel_optimized_models (ResNet-50), Intel C++ compiler ver. 17.0.2 20170213, Intel MKL small libraries version 2018.0.20170425. Caffe run with "numactl -l".
3. >50% predictability improvement with open source Redis using 2nd Gen Intel® Xeon® Scalable processors and Intel® Ethernet 800 Series with ADQ vs. without ADQ. Performance results are based on Intel internal testing as of February 2019, and may not reflect all publicly available security updates. See configuration disclosure for details. No product or component can be absolutely secure. Tests performed using Redis* Open Source on 2nd Generation Intel® Xeon® Scalable processors and Intel® Ethernet 800 series 100GbE on Linux 4.19.18 kernel. For complete configuration information see the [Performance Testing Application Device Queues \(ADQ\) with Redis Solution Brief](http://www.intel.com/content/www/us/en/architecture-and-technology/ethernet/application-device-queues-with-redis-brief.html) (<http://www.intel.com/content/www/us/en/architecture-and-technology/ethernet/application-device-queues-with-redis-brief.html>).

4. >45% latency reduction with open source Redis using 2nd Gen Intel® Xeon® Scalable processors and Intel® Ethernet 800 Series with ADQ vs. without ADQ. Performance results are based on Intel internal testing as of February 2019, and may not reflect all publicly available security updates. See configuration disclosure for details. No product or component can be absolutely secure. Tests performed using Redis Open Source on 2nd Generation Intel® Xeon® Scalable processors and Intel® Ethernet 800 series 100GbE on Linux 4.19.18 kernel. For complete configuration information see the [Performance Testing Application Device Queues \(ADQ\) with Redis Solution Brief \(http://www.intel.com/content/www/us/en/architecture-and-technology/ethernet/application-device-queues-with-redis-brief.html\)](http://www.intel.com/content/www/us/en/architecture-and-technology/ethernet/application-device-queues-with-redis-brief.html).
5. >30% throughput improvement with open source Redis using 2nd Gen Intel® Xeon® Scalable processors and Intel® Ethernet 800 Series with ADQ vs. without ADQ. Performance results are based on Intel internal testing as of February 2019, and may not reflect all publicly available security updates. See configuration disclosure for details. No product or component can be absolutely secure. Tests performed using Redis Open Source on 2nd Generation Intel® Xeon® Scalable processors and Intel® Ethernet 800 series 100GbE on Linux 4.19.18 kernel. For complete configuration information see the [Performance Testing Application Device Queues \(ADQ\) with Redis Solution Brief \(http://www.intel.com/content/www/us/en/architecture-and-technology/ethernet/application-device-queues-with-redis-brief.html\)](http://www.intel.com/content/www/us/en/architecture-and-technology/ethernet/application-device-queues-with-redis-brief.html).