АРХИТЕКТУРА И ТЕХНОЛОГИИ INTEL ДЛЯ ПОСТРОЕНИЯ ОПТИМАЛЬНЫХ ВЫСОКОПРОИЗВОДИТЕЛЬНЫХ РЕШЕНИЙ

Михаил Цветков
02 Апреля 2019, ПАВТ
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1103 1024b DRAM to 512GB DCPMEM

1702 2048b EPROM to 1024Gb QLC

4004 4bit Processor (1971) to Intel Xeon Scalable
GENERAL PURPOSE ARCHITECTURE TAXONOMY

SCALAR

VECTOR

MATRIX

SPATIAL

CPU

GPU

AI

FPGA
41x рост производительности

INTEL XEON. 20 ЛЕТ.

Source: Intel

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**ИНТЕЛ® XEON® SCALABLE**

**ЛИДЕРУЮЩАЯ ПРОИЗВОДИТЕЛЬНОСТЬ**

VS OTHER X86 OFFERINGS

**МАКСИМАЛЬНАЯ ГИБКОСТЬ**

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</tbody>
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**1,2,4,8+ SOCKETS**

60 SKUS

1.7-3.6 GHZ

70-205 WATS

$213-$10,000 PRICE POINTS

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НОВАЯ АРХИТЕКТУРА ДЛЯ ДАННЫХ

Динамическая память
ПОСТОЯННАЯ ПАМЯТЬ
ДИСКИ
DRAM
SSD
HDD

ПРИЛОЖЕНИЕ
ФАЙЛОВАЯ СИСТЕМА
ДРАЙВЕР

DDR
PCIe/ SATA
SSD / SATA
Большая и Доступная память
Высокопроизводительное хранилище
Прямой Load/Store
Энергонезависимая
128GB, 256GB, 512GB
DDR4 DIMM
Безопасность
Высокая надежность
INTEL® MEMORY DRIVE TECHNOLOGY CAN EXPAND SYSTEM MEMORY CAPACITY

DRAM-ONLY 2-SOCKET MEMORY CAPACITY

Intel® Memory Drive Technology capacity = up to 24TB

UP TO 8X GREATER CAPACITY!

Intel® Optane™ SSD
Intel® Optane™ SSD
Intel® Optane™ SSD

Intel® Memory Drive Technology
Intel® Memory Drive Technology
Intel® Memory Drive Technology

INTEL® MEMORY DRIVE TECHNOLOGY 2-SOCKET SERVER MEMORY CAPACITY

DRAM-only memory capacity = up to 3TB

1. For example: 128GB DRAM can be expanded up to 1024GB based on the capacity of the non-volatile memory media installed. Higher expansion ratios may be supported, with possibly suboptimal performance.
ПОРТФОЛИО INTEL ДЛЯ ПЕРЕДАЧИ ДАННЫХ

**INTEL® ETHERNET**
30+ лет лидерства

**INTEL® SILICON PHOTONICS**
Кремний, который светит

**INTEL® OMNI-PATH FABRICS**
Интерконект для суперкомпьютеров
ПЕРВЫЙ EXAFLOP: ПРОЕКТ AURORA (HPC И AI)
BENCHMARK & CONFIGURATION DETAILS
INTEL® XEON® SCALABLE PROCESSOR CONFIGURATION DETAILS

1.48x: Per Core Performance
Intel Xeon Platinum 8180: Intel Xeon-based Reference Platform with 2 Intel Xeon 8180 (2.5GHz, 28 core) processors, BIOS ver SESC620.86B.00.01.0014.070920180847, 07/09/2018, microcode: 0x200004d, HT ON, Turbo ON, 12x32GB DDR4-2666, 1 SSD, Ubuntu 18.04.1 LTS (4.17.0-041700-generic Retpoline), 1-copy SPEC CPU 2017 integer rate base benchmark compiled with Intel Compiler 18.0.2 -O3, executed on 1 core using taskset and numaclt on core 0. Estimated score = 6.59, as of 8/2/2018 tested by Intel
AMD EPYC 7601: Supermicro AS-2033US-TR4 with 2 AMD EPYC 7601 (2.2GHz, 32 core) processors, BIOS ver 1.1a, 4/26/2018, microcode: 0x8001227, SMT ON, Turbo ON, 16x32GB DDR4-2666, 1 SSD, Ubuntu 18.04.1 LTS (4.17.0-041700-generic Retpoline), 1-copy SPEC CPU 2017 integer rate base benchmark compiled with AOCC 1.0 -Oast, -march=znver1, executed on 1 core using taskset and numaclt on core 0. Estimated score = 4.45, as of 8/2/2018 tested by Intel

3.20x: High Performance Linpack
Intel Xeon Platinum 8180: Intel Xeon-based Reference Platform with 2 Intel Xeon 8180 (2.5GHz, 28 core) processors, BIOS ver SESC620.86B.00.01.0014.070920180847, 07/09/2018, microcode: 0x200004d, HT ON (1 thread per core), Turbo ON, 12x32GB DDR4-2666, 1 SSD, Ubuntu 18.04.1 LTS (4.17.0-041700-generic Retpoline), High Performance Linpack v2.1, compiled with Intel(R) Parallel Studio XE 2018 for Linux, Intel MPI and MKL Version 18.0.0.128, Benchmark Config: Nb=384, N=20316, P=1, Q=2, Q=4, Score = 3507.38GFs, as of July 31, 2018 tested by Intel
AMD EPYC 7601: Supermicro AS-2033US-TR4 with 2 AMD EPYC 7601 (2.2GHz, 32 core) processors, SMT OFF, Turbo ON, BIOS ver 1.1a, 4/26/2018, microcode: 0x8001227, 16x32GB DDR4-2666, 1 SSD, Ubuntu 18.04.1 LTS (4.17.0-041700-generic Retpoline), High Performance Linpack v2.2, compiled with Intel(R) Parallel Studio XE 2018 for Linux, Intel MPI version 18.0.0.128, AMD BLS ver 0.4.0, Benchmark Config: Nb=232, N=168960, P=4, Q=4, Score = 1095GFs, as of July 31, 2018 tested by Intel

1.85x: Database
Intel Xeon Platinum 8180: Intel Xeon-based Reference Platform with 2 Intel Xeon 8180 (2.5GHz, 28 core) processors, BIOS ver SESC620.86B.0X.01.0115.012820180604, microcode: 0x200004d, HT ON, Turbo ON, 24x32GB DDR4-2666, 1 x Intel DC P3700 PCI-E SSD (2TB, 1/2 Height PCIe 3.0, 20nm, MLC), Red Hat Enterprise Linux 7.4 (3.10.0-693.11.6.el7.x86_64 IBRS), HammerDB ver 2.3, PostgreSQL ver 9.6.5, Score = 2,250,481 tpm, as of 3/15/2018 tested by Intel
AMD EPYC 7601: HPE Proliant DL385 Gen10 with 2 AMD EPYC 7601 (2.2GHz, 32 core) processors, ROM ver 1.06, microcode: 0x8001227, SMT OFF, Turbo ON, 16x32GB DDR4-2666, 1 x Intel DC P3700 PCI-E SSD (2TB, 1/2 Height PCIe 3.0, 20nm, MLC), Red Hat Enterprise Linux 7.4 (3.10.0-693.21.1.el7.x86_64 Retpoline), HammerDB ver 2.3, PostgreSQL ver 9.6.5, Score = 1,210,575 tpm, as of 4/12/2018 tested by Intel

1.45x: Memcached (Memory Object Caching)
Intel Xeon Platinum 8180: Intel Xeon-based Reference Platform with 2 Intel Xeon 8180 (2.5GHz, 28C) processors, BIOS ver SESC620.86B.00.01.0014.070920180847, 07/09/2018, microcode: 0x200004d, HT ON, Turbo ON, 12x32GB DDR4-2666, 1SSD, 1 40GBe PCIe XL710 Adapter, Ubuntu 18.04.1 LTS (4.17.0-041700-generic Retpoline), Memcached using YCSB benchmark Workloadc, YCSB 0.16.0, Memcached v1.5.9, Max throughput (ops/sec) with P99 latency < 1ms, Score: 2711265 ops/sec, as of 8/2/2018 tested by Intel
AMD EPYC 7601: Supermicro AS-2033US-TR4 with 2 AMD EPYC 7601 (2.2GHz, 32C) processors, BIOS ver 1.1a, 4/26/2018, microcode: 0x8001227, SMT ON, Turbo ON, 16x32GB DDR4-2666, 1SSD, 1 40GBe PCIe XL710 Adapter, Ubuntu 18.04.4 LTS (4.17.0-041700-generic Retpoline), Memcached using YCSB benchmark Workloadc, YCSB 0.16.0, Memcached v1.5.9, Max throughput (ops/sec) with P99 latency < 1ms, Score: 1862841 ops/sec, as of 8/2/2018 tested by Intel

1.72x: L3 Packet Forwarding
Intel Xeon Platinum 8180: Supermicro X11DPG-QT with 2 Intel Xeon-SF 8180 (2.5GHz, 28C) processors, BIOS ver 2.0b, microcode: 0x200004d, 12x32GB DDR4-2666, 1 SSD, 2x Intel XXV710-DA2 PCI Express (2x25GBe), DPDK L3fwd sample application (IPv4 LPM, 256B packet size, 625000 flows), DPDK 17.11, Ubuntu 17.10, (4.13.0-31-generic IBRS), HT ON, Turbo OFF, Score= 42.22 Million Packets / second, as of 8/2/2018 tested by Intel
AMD EPYC 7601: Supermicro AS-2033US-TR4 with 2 AMD EPYC 7601 (2.2GHz, 32C) processors, BIOS ver 1.1a, microcode: 0x8001227, 16x32GB DDR4-2666, 1 SSD, 2x Intel XXV710-DA2 PCI Express (2x25GBe), DPDK L3fwd sample application (IPv4 LPM, 256B packet size, 625000 flows), DPDK 17.11, Ubuntu 17.10 (4.13.0-36-generic Retpoline), SMT ON, Turbo (core boost) OFF, Score= 24.52 Million Packets / second, as of 8/2/2018 tested by Intel
INTEL OPTANE PERSISTENT MEMORY CONFIGURATION DETAILS

Performance results are based on testing: 8X (8/2/2018), 9X Reads/11X Users (5/24/2018), Minutes to Seconds (5/30/2018) and may not reflect all publicly available security updates. No product can be absolutely secure. Results have been estimated based on tests conducted on pre-production systems: 8x (running OAP with 2.6TB scale factor on IO intensive queries), 9X Reads/11X Users (running Cassandra optimized for persistent memory), and Minutes to Seconds (running Aerospike* Hybrid Memory Architecture optimized for persistent memory), and provided to you for informational purposes.