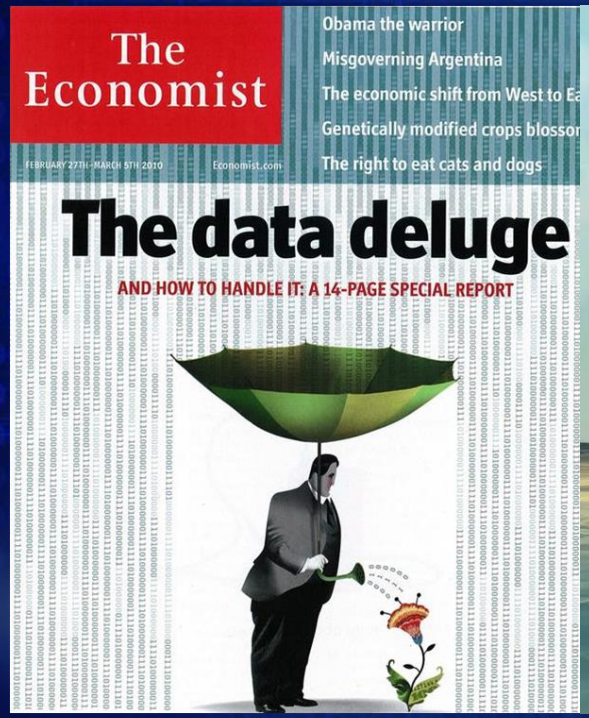
INTEL®
INNOVATION
DAY

# СЕРВЕРНЫЕ ПРОДУКТЫ INTEL

Василий Лизунов,
Менеджер по развитию бизнеса Intel

INTEL® INNOVATION DAY

# ДАННЫЕ ЭТО БУДУЩЕЕ



Other names and brands may be claimed as the property of others.

# НОВАЯ ЭРА ТЕХНОЛОГИЙ ДАТАЦЕНТРА

## АРХИТЕКТУРА ДАТАЦЕНТРА

### MOVE FASTER

- intel SILICON PHOTONICS
- intel OMNI-PATH FABRIC
- intel STRATIX 10 inside
- intel ETHERNET

### STORE MORE

- intel OPTANE DC SOLID STATE DRIVE
- intel OPTANE DC PERSISTENT MEMORY

### PROCESS EVERYTHING

- intel XEON PLATINUM inside
- intel STRATIX 10 inside
- intel NERVANA inside

DATA-CENTRIC INNOVATION SUMMIT

intel

# НОВАЯ ЭРА ТЕХНОЛОГИЙ ДАТАЦЕНТРА

## АРХИТЕКТУРА ДАТАЦЕНТРА

### MOVE FASTER

- intel SILICON PHOTONICS
- intel OMNI-PATH FABRIC
- intel STRATIX 10 inside
- intel ETHERNET

### STORE MORE

- intel OPTANE DC SOLID STATE DRIVE
- intel OPTANE DC PERSISTENT MEMORY

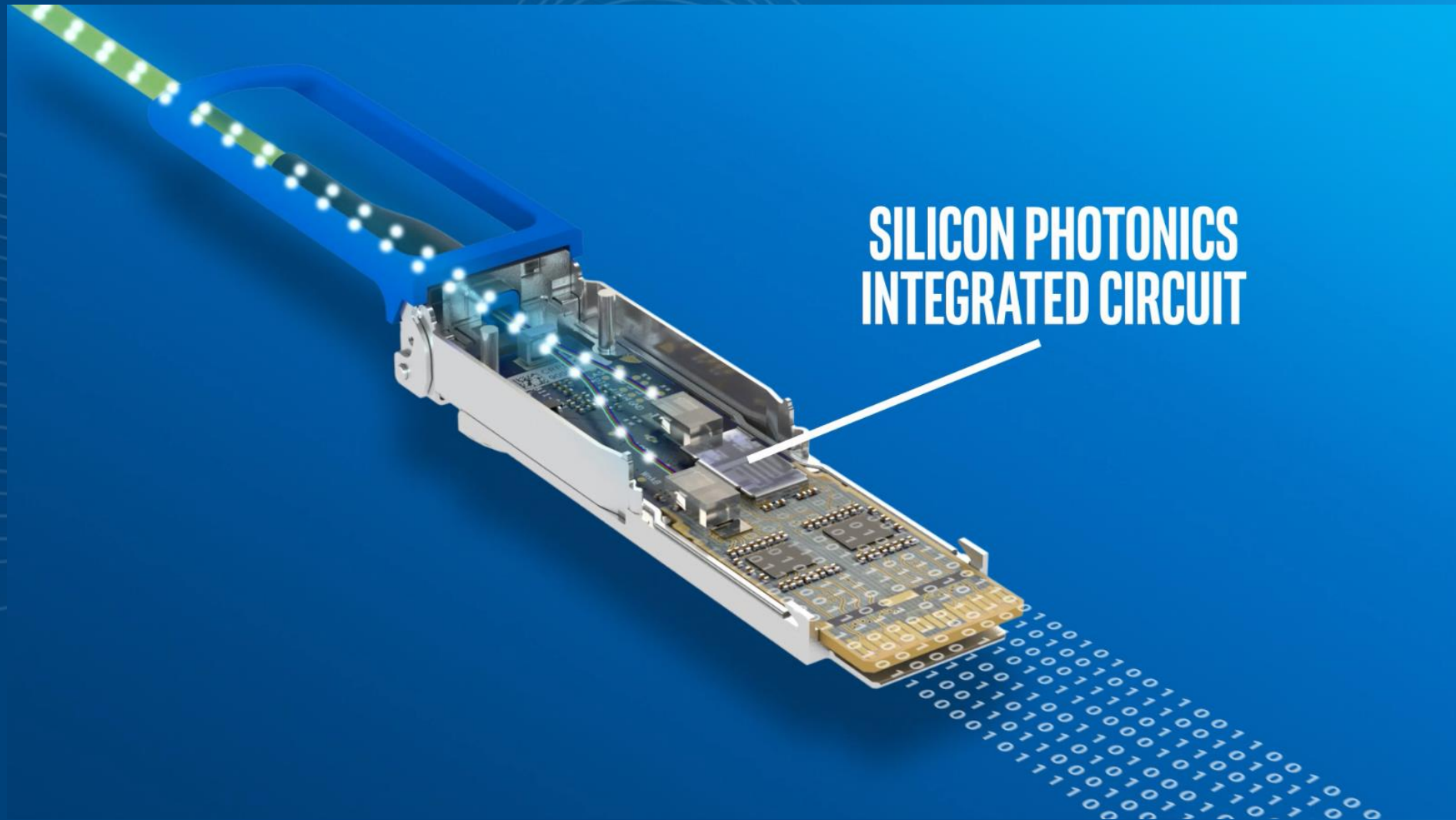
### PROCESS EVERYTHING

- intel XEON PLATINUM inside
- intel STRATIX 10 inside
- intel NERVANA inside

DATA-CENTRIC INNOVATION SUMMIT

intel

# SI-PH ВИДЕО




INTEL® INNOVATION DAY

# НОВАЯ ЭРА ТЕХНОЛОГИЙ ДАТАЦЕНТРА

## АРХИТЕКТУРА ДАТАЦЕНТРА

### MOVE FASTER

intel SILICON PHOTONICS

intel OMNI-PATH FABRIC

intel STRATIX 10 inside

intel ETHERNET

### STORE MORE

intel OPTANE DC SOLID STATE DRIVE

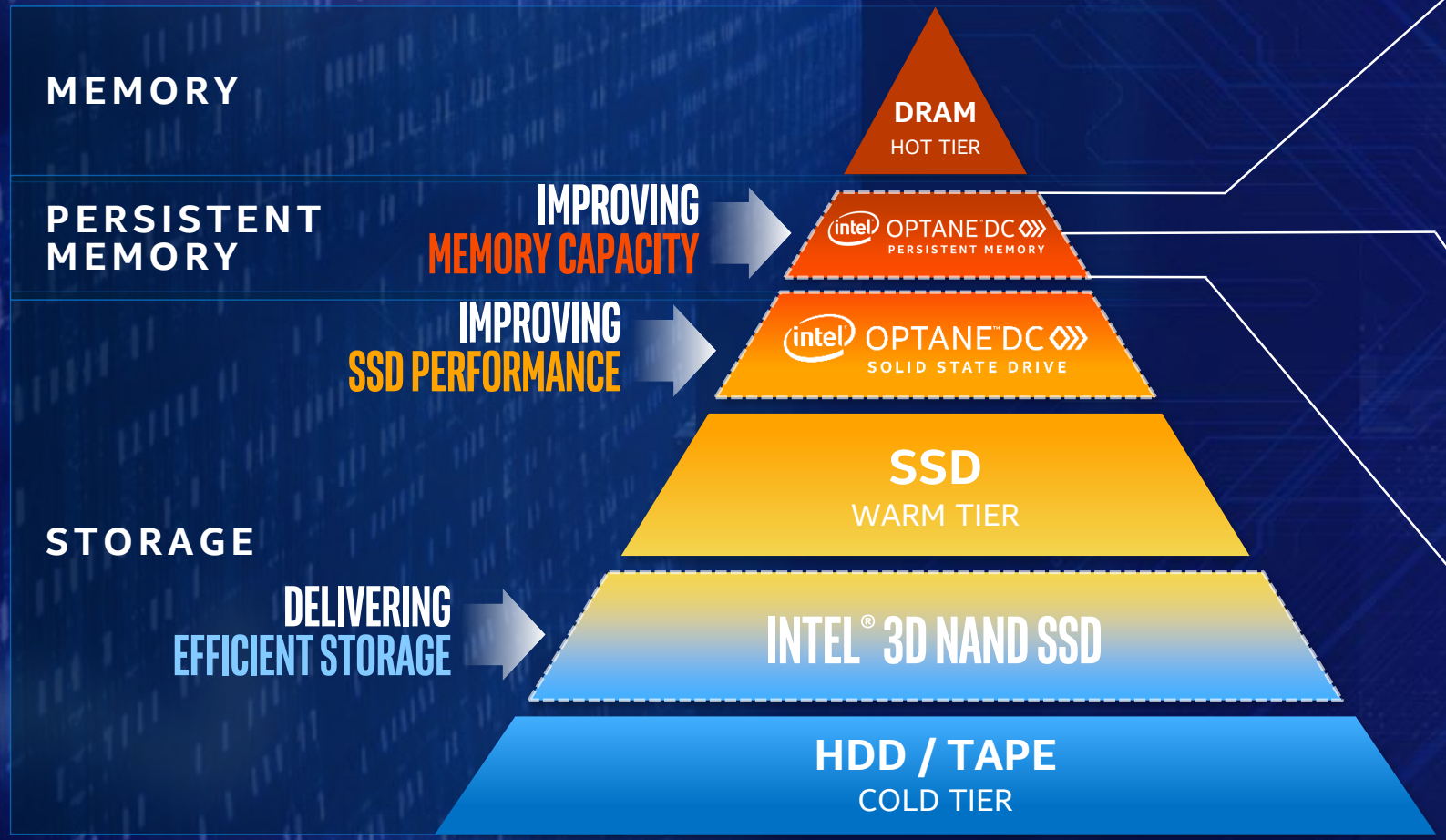
intel OPTANE DC PERSISTENT MEMORY

### PROCESS EVERYTHING

DATA-CENTRIC INNOVATION SUMMIT

intel

# НОВАЯ ПОДСИСТЕМА ХРАНЕНИЯ




## SPARK SQL DS

**8X MORE PERFORMANCE**

VS. DRAM AT 2.6TB DATA SCALE

## VALUE OF PERSISTENCE

**MINUTES TO SECONDS**

START TIME

**THREE 9s TO FIVE 9s**

AVAILABILITY

## APACHE CASSANDRA

**9X MORE READ TRANSACTIONS**

**11X MORE USERS PER SYSTEM**

VS. COMPARABLE SERVER SYSTEM WITH DRAM & NAND NVME DRIVES

Note: 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. See configuration disclosure for details. 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 information go to www.intel.com/benchmarks. Other names and brands may be claimed as the property of others.

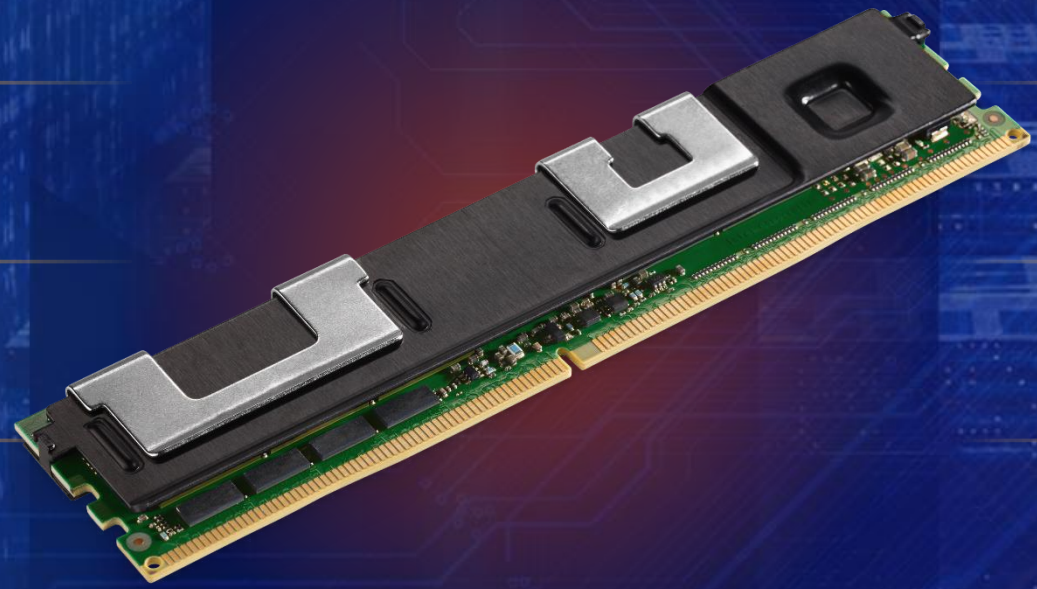
# intel OPTANE™ DC PERSISTENT MEMORY

BIG AND AFFORDABLE MEMORY

HIGH PERFORMANCE STORAGE

DIRECT LOAD/STORE ACCESS

NATIVE PERSISTENCE



UP TO 512GB MODULES

DDR4 PIN COMPATIBLE

HARDWARE ENCRYPTION

HIGH RELIABILITY

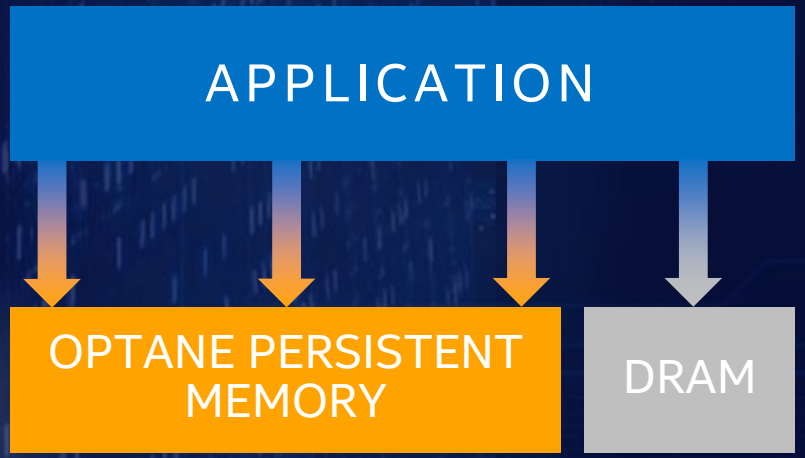
intel

# ПОДДЕРЖКА МНОГИХ ПРИЛОЖЕННИЙ

intel OPTANE™ DC PERSISTENT MEMORY

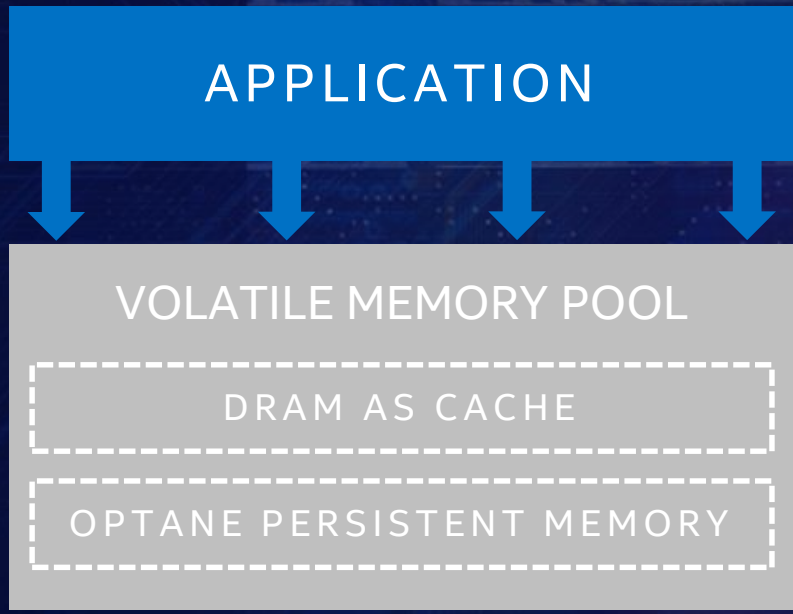
## APP DIRECT MODE

PERSISTENT PERFORMANCE & MAXIMUM CAPACITY




## MEMORY MODE

AFFORDABLE MEMORY CAPACITY FOR MANY APPLICATIONS




intel

# AEP ВИДЕО

intel® OPTANE™ DC
PERSISTENT MEMORY

https://software.intel.com/pmem

INTEL® INNOVATION DAY

# НОВАЯ ЭРА ТЕХНОЛОГИЙ ДАТАЦЕНТРА

## АРХИТЕКТУРА ДАТАЦЕНТРА

### MOVE FASTER

- intel SILICON PHOTONICS
- intel OMNI-PATH FABRIC
- intel STRATIX 10 inside
- intel ETHERNET

### STORE MORE

- intel OPTANE DC SOLID STATE DRIVE
- intel OPTANE DC PERSISTENT MEMORY

### PROCESS EVERYTHING

- intel XEON PLATINUM inside
- intel STRATIX 10 inside
- intel NERVANA inside

DATA-CENTRIC INNOVATION SUMMIT

intel

# 20-ЛЕТИЕ INTEL® XEON® PROCESSOR

1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016 2017 2018

AI, NETWORK & HPC
SKYLAKE
DATABASE
BROADWELL
HASWELL
IVY BRIDGE
1ST CLOUD CUSTOM CPU
VISUAL CLOUD
STORAGE
ENCRYPTION
SANDY BRIDGE
WESTMERE | BECKTON
NEHALEM
ALLENDALE | WOLFDALE | DUNNINGTON
VIRTUALIZATION
FIELD | HARPERTOWN
DEMPSEY | SOSSAMAN | WOODCREST
IRWINDALE | PAXVILLE
NOCONA
>2S SUPPORT
PRESTONIA | GALLATIN
FOSTER
TANNER | CASCADES
DRAKE

DATA-CENTRIC
INNOVATION SUMMIT

intel

# ГОДОВЩИНА

# INTEL® XEON® SCALABLE PROCESSOR

**LARGEST** EARLY SHIP PROGRAM

**FASTEST** XEON RAMP TO 1M UNITS

**50%** OF XEON VOLUME

**>2M** UNITS SHIPPING PER QUARTER

## LEADERSHIP PERFORMANCE

VS OTHER X86 OFFERINGS

UP TO **1.48X** PER CORE

UP TO **1.72X** L3 PACKET FWD

UP TO **3.2X** HIGH PERF. LINPACK

UP TO **1.85X** DATABASE

UP TO **1.45X** MEMORY CACHING

## ULTIMATE FLEXIBILITY

**1,2,4,8+** SOCKETS

**60** SKUS

**1.7-3.6** GHZ

**70-205** WATTS

**$213-$10,000** PRICE POINTS

DATA-CENTRIC INNOVATION SUMMIT

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 www.intel.com/benchmarks. Performance results are based on testing as of 8/3/2018 and may not reflect all publicly available security updates. See configuration disclosure in backup for details. No product can be absolutely secure. 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).

intel

# БОЛЬШАЯ ДОЛЯ РЫНКА В ИИ

"Machine learning is a big part of our heritage. It works on GPUs today, but it also works on instances **powered by highly customized Intel Xeon processors**"

Bratin Saha
VP & GM, Machine Learning Platforms
Amazon AI - Amazon

## IN 2017 AI DROVE >$1B INTEL XEON REVENUE

"Inference is one thing we do, but we do lots more. That's why **flexibility is really essential**."

Kim Hazelwood
Head of AI Infrastructure Foundation
Facebook

INTEL® XEON® PROCESSOR AI WINS

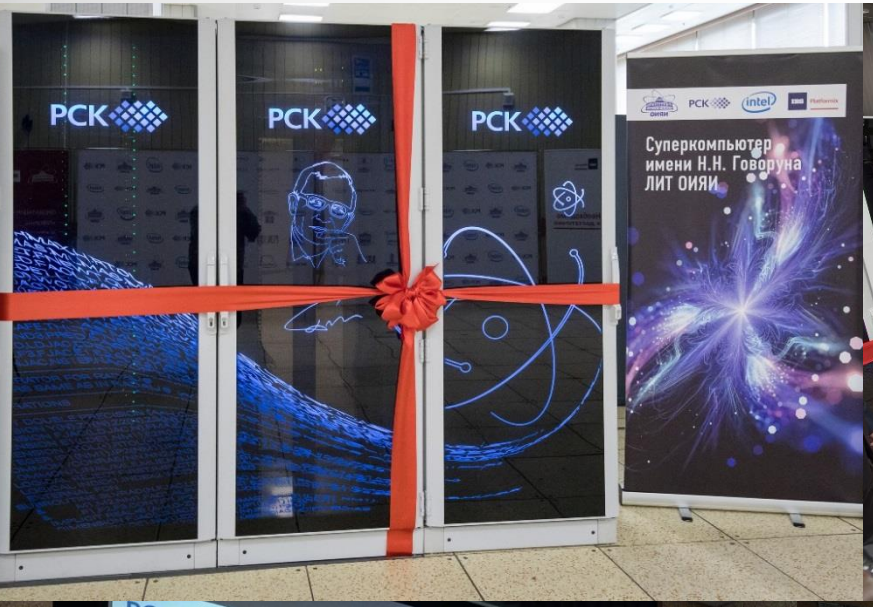
Alibaba Cloud · aws · bluedata · cdhi · CRAY · DELL EMC · GIGASPACES innovate with confidence
Google Cloud · 科大讯飞 iFLYTEK · JD.COM 京东 · KYOTO UNIVERSITY · MTC · NOVARTIS
NYU Langone MEDICAL CENTER · Taboola · 头条 TOUTIAO · UCLOUD · UnionPay 银联

DATA-CENTRIC INNOVATION SUMMIT

Other names and brands may be claimed as the property of others.

intel

# Первый в мире гиперконвергентный суперкомпьютер со 100% охлаждением на «горячей воде» (ОИЯИ)



# Решение «РСК Торнадо» в ОИЯИ

- **Один из самых современных в России научных вычислительных центров**
- **Уникальная гетерогенная и гиперконвергентная система**
- **9-е место в мировом рейтинге IO500**
- **Многоцелевой вычислительный комплекс с прямым жидкостным охлаждением всех компонент решения**
- **Самая энергоэффективная система в РФ (PUE = 1,027)**
- **Первое внедрение в России технологии Intel® Omni-Path со 100% жидкостным охлаждением**
- Суммарная пиковая производительность – **210,816 ТФЛОПС**

## Состав суперкомпьютера

- **Узлы «РСК Торнадо» на Intel® Xeon® Scalable:**
  - Производительность – **138,24** ТФЛОПС
  - Процессоры **Intel® Xeon® Gold 6154** (18 ядер)
  - Серверные платы **Intel® Server Board S2600BP**
  - Твердотельные накопители **Intel® SSD DC S3520 (SATA, M.2)**, 2 x **Intel ® SSD DC P4511 (NVMe, M.2)** емкостью 1 Тбайт
  - Память на узле – 192 ГБ DDR4 2666 ГГц
  - Адаптер **Intel® Omni-Path** 100 Гбит/с
  - 48-портовые коммутаторы **Intel® Omni-Path Edge Switch 100 Series** со 100% жидкостным охлаждением
- **Узлы «РСК Торнадо» на Intel® Xeon Phi™:**
  - Производительность – **72,576** ТФЛОПС
  - Процессоры **Intel® Xeon Phi™ 7190** (72 ядра)
  - Серверные платы **Intel® Server Board S7200AP**
  - Твердотельный накопитель **Intel® SSD DC S3520 (SATA, M.2)**
  - Память на узле – 96 ГБ DDR4 2400 ГГц
  - Адаптер **Intel® Omni-Path 100 Гбит/с**
  - 48-портовый коммутатор **Intel® Omni-Path Edge Switch 100 Series** со 100% жидкостным охлаждением

## Программный стек «РСК БазИС» для мониторинга и управления

NEXT INTEL® XEON® SCALABLE PROCESSOR

# CASCADE LAKE

## WITH INTEL® OPTANE™ DC PERSISTENT MEMORY

Leadership Performance

Optimized Cache Hierarchy

Higher Frequencies

Support For intel OPTANE™ DC PERSISTENT MEMORY

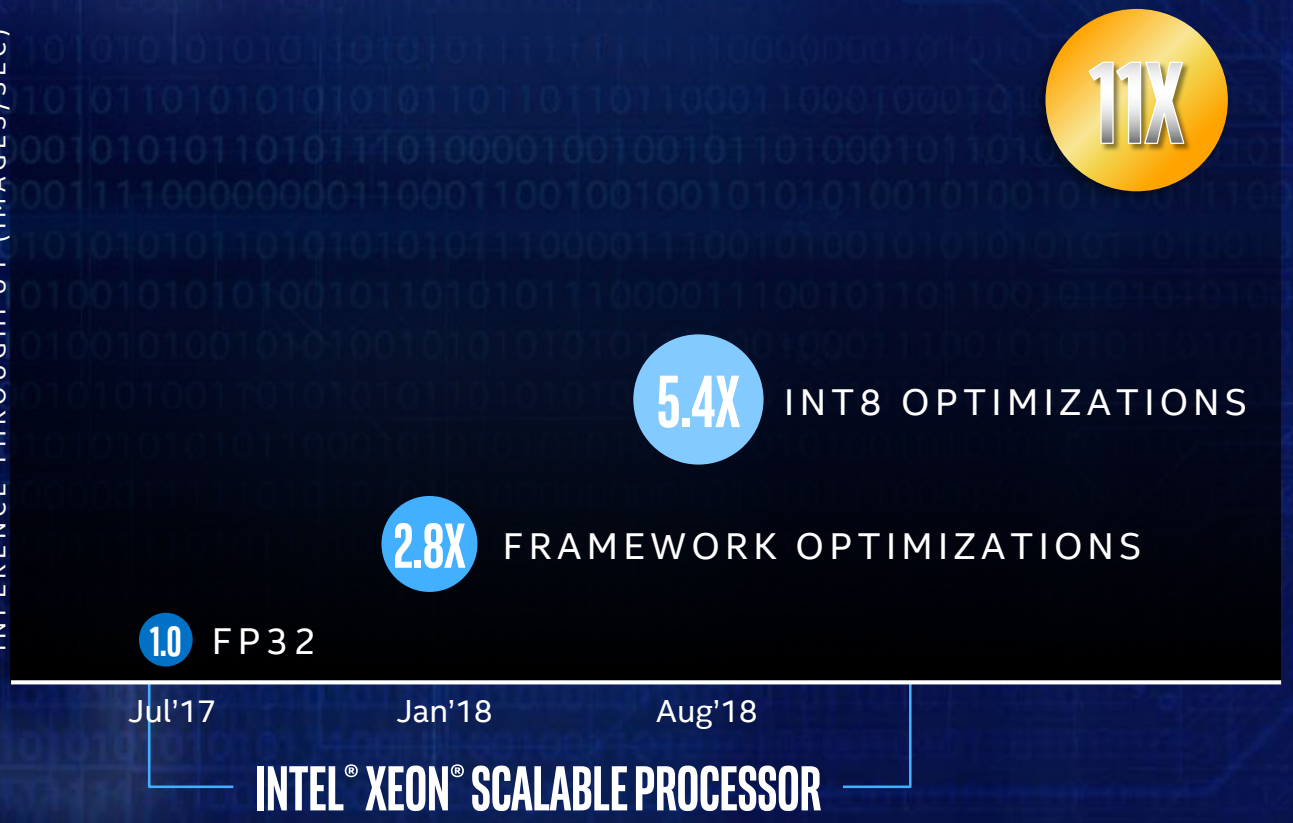
Security Mitigations

Optimized Frameworks & Libraries

DATA-CENTRIC INNOVATION SUMMIT

intel

# REINVENTING XEON FOR AI




INTRODUCING

## INTEL® DEEP LEARNING BOOST

**VNNI** VECTOR NEURAL NETWORK INSTRUCTION

FOR INFERENCE ACCELERATION

### FRAMEWORK & LIBRARY SUPPORT

Caffe mxnet TensorFlow

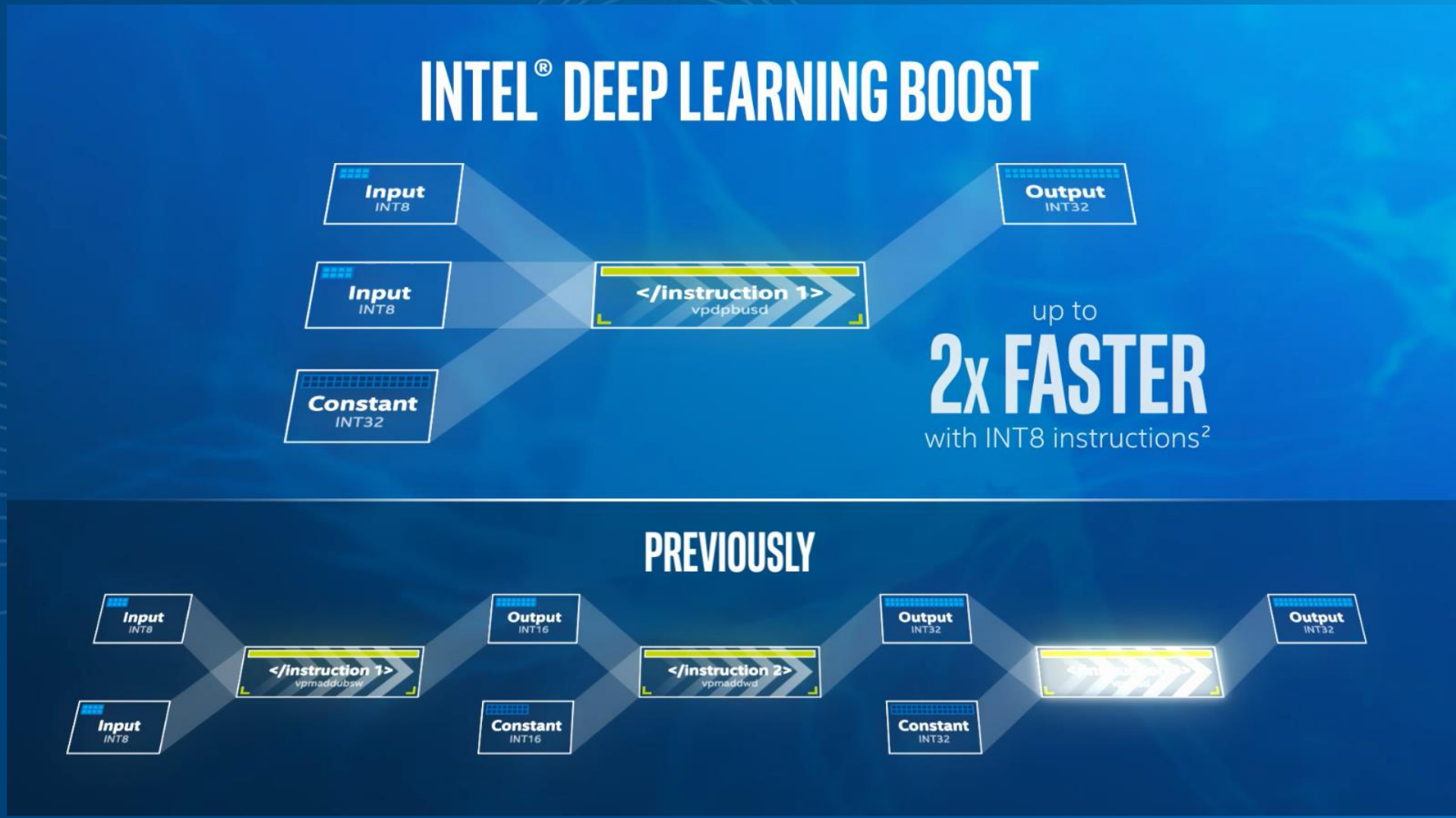
intel MKL-DNN

1 Intel® Optimization for Caffe Resnet-50 performance does not necessarily represent other Framework performance.
2 Based on Intel internal testing: 1X (7/11/2017), 2.8X (1/19/2018) and 5.4X (7/26/2018) performance improvement based on Intel® Optimization for Café Resnet-50 inference throughput performance on Intel® Xeon® Scalable Processor.
3 11X (7/25/2018) Results have been estimated using internal Intel analysis, and provided to you for informational purposes. Any differences in your system hardware, software or configuration may affect your actual performance.
Performance results are based on testing as of 7/11/2017(1x), 1/19/2018(2.8x) & 7/26/2018(5.4) and may not reflect all publically available security update. See configuration disclosure for details (config 1). No product can be absolutely secure.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.
Other names and brands may be claimed as the property of others.



intel

# VNNI ВИДЕО




INTEL® INNOVATION DAY

# CASCADE LAKE ADVANCED PERFORMANCE

NEW CLASS OF INTEL® XEON® SCALABLE PROCESSORS

## CASCADE LAKE ADVANCED PERFORMANCE

2-SOCKET SERVER

**PERFORMANCE LEADERSHIP** ARCHITECTED FOR DEMANDING HPC, AI & IAAS WORKLOADS

**UNPRECEDENTED MEMORY BANDWIDTH** MORE MEMORY CHANNELS THAN ANY OTHER CPU

**PERFORMANCE OPTIMIZED MULTI CHIP PACKAGE** HIGH SPEED INTERCONNECT

## PERFORMANCE LEADERSHIP

LINPACK: UP TO 3.4X

STREAM TRIAD: UP TO 1.3X

vs AMD EPYC 7601

DL INFERENCE: UP TO 17X IMAGES PER SECOND

vs Intel® Xeon® Platinum Processor at launch

Performance Leadership: Based on our current understanding of the Linpack performance of general purpose processors commercially available in 2019. Unprecedented Memory Bandwidth: Native DDR memory bandwidth. 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 www.intel.com/benchmarks. Results have been estimated or simulated using internal Intel analysis or architecture simulation or modeling, and provided to you for informational purposes. Any differences in your system hardware, software or configuration may affect your actual performance.

Performance results are based on testing or projections as of 6/2017 to 10/3/2018 (Stream Triad), 7/31/2018 to 10/3/2018 (LINPACK) and 7/11/2017 to 10/7/2018 (DL Inference) and may not reflect all publicly available security updates. See configuration disclosure in backup for details. No product can be absolutely secure. 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). Other names and brands may be claimed as the property of others.

intel

# ЗАГЛЯНЕМ В БУДУЩЕЕ

2018 | 2019 | 2020

14NM/10NM PLATFORM

## CASCADE LAKE
14NM
SHIPPING Q4'18

INTEL OPTANE PERSISTENT MEMORY

INTEL DLBOOST: VNNI

SECURITY MITIGATIONS

## COOPER LAKE
14NM

NEXT GEN INTEL DLBOOST: BFLOAT16

## ICE LAKE
10NM

LEADERSHIP PERFORMANCE

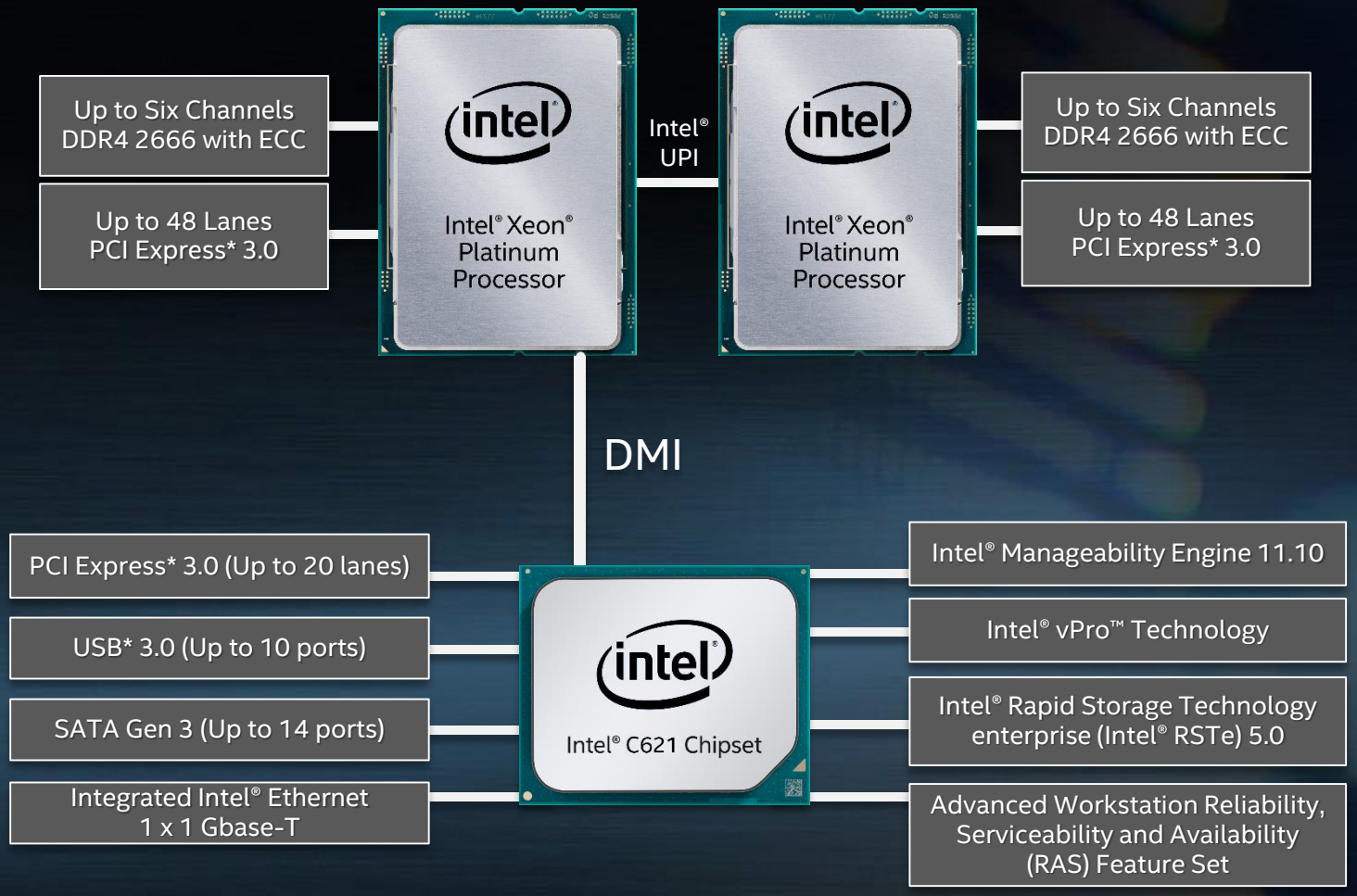
intel
Arctic Sound

# CUSTOMER-OPTIMIZED PLATFORMS

| PRIOR ALIGNMENT | | | |
|---|---|---|---|
| INTEL® XEON® E5-2600 PROCESSOR DUAL SOCKET CONFIGURATIONS | | INTEL® XEON® SCALABLE PROCESSORS | EXPERT |
| PRIOR ALIGNMENT | | | |
| INTEL® XEON® E5-1600 PROCESSOR | | INTEL® XEON® W PROCESSORS | MAINSTREAM |
| PRIOR ALIGNMENT | | | |
| INTEL® XEON® E3 PROCESSORS | | INTEL® XEON® E PROCESSORS | ENTRY |

# INTEL® XEON® SCALABLE PROCESSORS

## BREAKTHROUGH PERFORMANCE FOR EXPERT WORKSTATIONS

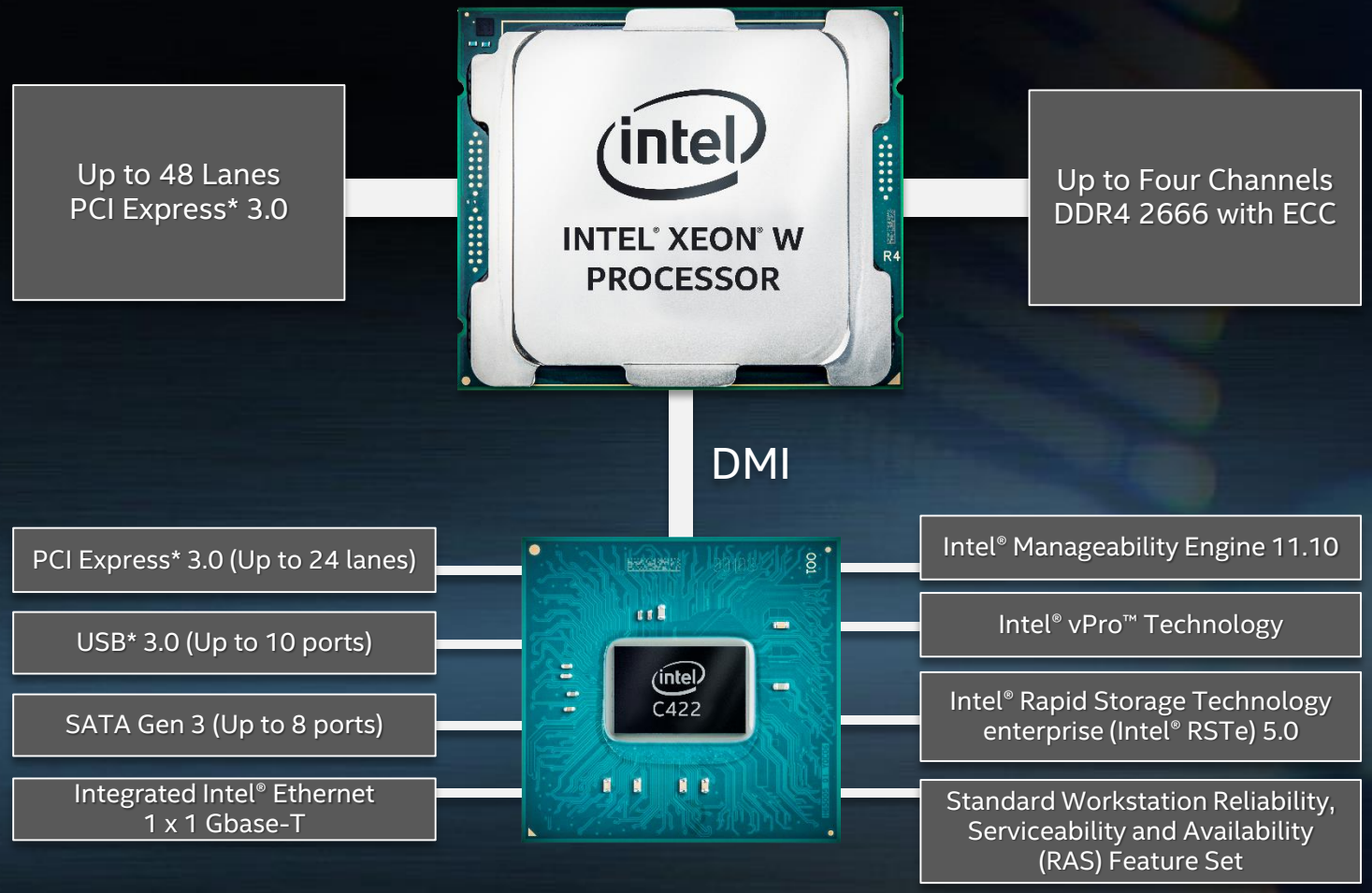



*Processors, chipset and diagram provided for illustration purposes only*

| | |
|---|---|
| Processor Manufacturing Process | Intel's 14nm process technology featuring Intel® Mesh Architecture |
| Maximum Core Count Supported | Up to 28 |
| Maximum Base Frequency Supported | Up to 3.6 GHz |
| Maximum Intel® Turbo Boost Technology 2.0 Frequency Supported | Up to 4.2 GHz |
| Processor Cache Memory Support | Up to 38.5 MB of L3 Cache featuring rebalanced Intel® Cache hierarchy |
| Processor Performance Support | Intel® Turbo Boost 2.0 Technology, Intel® Hyper-Threading Technology (Intel® HT), Intel® Speed Shift Technology |
| Intel® Advanced Vector Extension 512 (Intel® AVX-512) Support | Intel® AVX-512 with up to 2 FMA support |
| Maximum Number of Processor Sockets Supported | Up to Two Sockets for Expert Workstations |
| Thermal Design Point (TDP) | Approximately 240 Watts |
| Socket Type | LGA-3647 |
| System Memory Support | 6 channels of DDR4 2666 MHz with ECC support, per socket |
| Maximum System Memory Supported | Up to 3 TB in a dual-socket configuration |
| Supported Chipset | Intel® C621 Chipset |
| PCH I/O | PCI Express* 3.0 – Up to 20 lanes<br>USB* 3.0 – Up to 10 ports<br>SATA* 3.0 – Up to 14 ports<br>DMI – Up to 4 lanes, Gen 3 |
| Intel® Manageability Engine (Intel® ME) | Intel® ME v11.11 with Intel® Active Management Technology (Intel® AMT) and Intel® vPro™ Technology |
| Intel® Rapid Storage Technology enterprise (Intel® RSTe) | Intel® RSTe 5.0 and Intel® Virtual RAID on Chip (Intel® VROC) |

# INTEL® XEON® W PROCESSORS

## PERFORMANCE OPTIMIZED FOR MAINSTREAM WORKSTATIONS



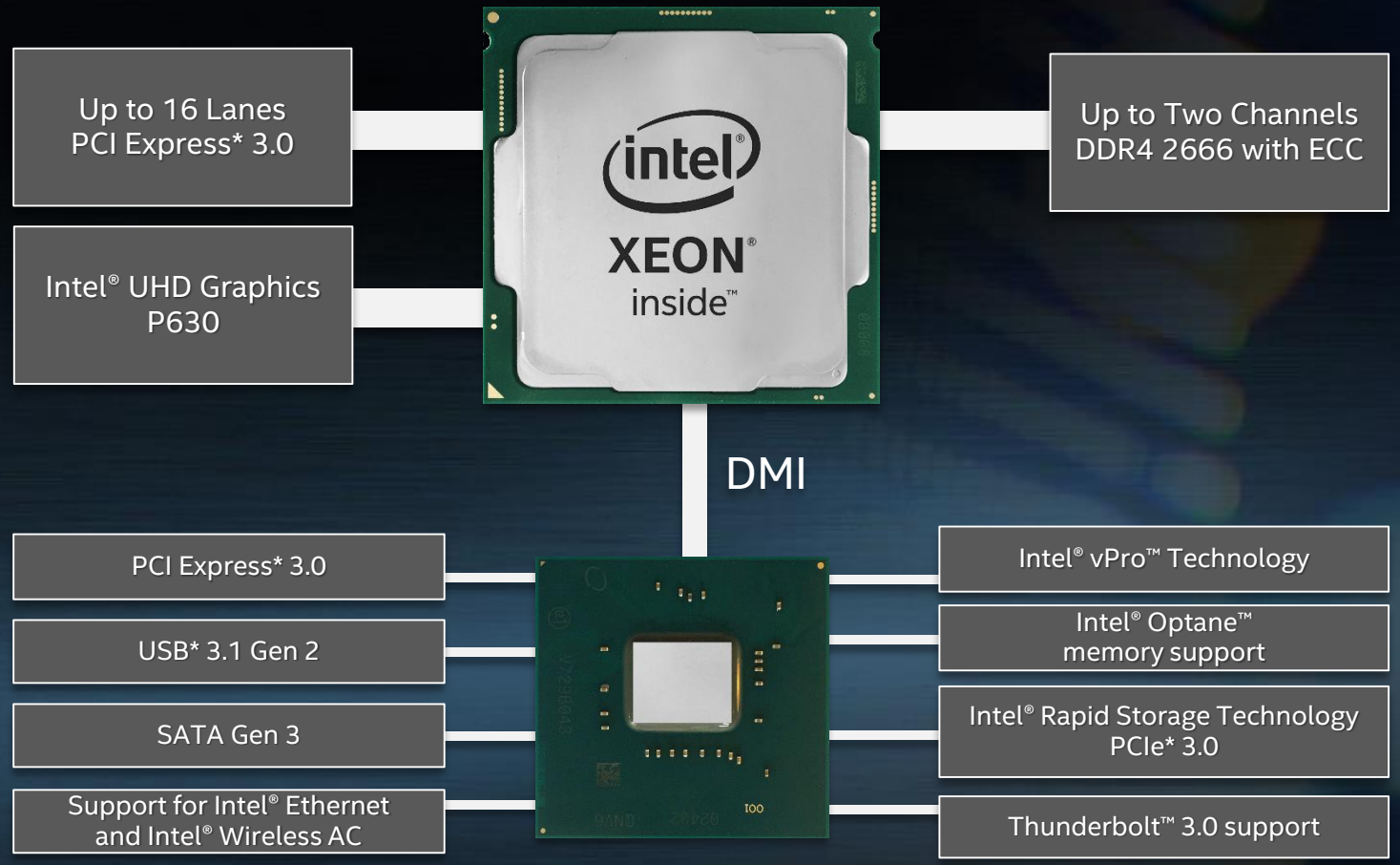

*Processor, chipset and diagram provided for illustration purposes only*

| | |
|---|---|
| Processor Manufacturing Process | Intel's 14nm process technology featuring Intel® Mesh Architecture |
| Maximum Core Count Supported | Up to 18 |
| Maximum Base Frequency Supported | Up to 4.0 GHz |
| Maximum Intel® Turbo Boost Technology 2.0 Frequency Supported | Up to 4.5 GHz |
| Processor Cache Memory Support | Up to 24.75 MB of L3 Cache featuring rebalanced Intel® Cache hierarchy |
| Processor Performance Support | Intel® Turbo Boost 2.0 Technology, Intel® Hyper-Threading Technology (Intel® HT), Intel® Speed Shift Technology |
| Intel® Advanced Vector Extension 512 (Intel® AVX-512) Support | Intel® AVX-512 with up to 2 FMA support |
| Maximum Number of Processor Sockets Supported | One Socket |
| Thermal Design Point (TDP) | Approximately 140 Watts |
| Socket Type | Socket R4 (LGA-2066 Socket) |
| System Memory Support | 4 channels of DDR4 2666 MHz 2 DPC<br>RDIMM and LRDIMM with ECC support |
| Maximum System Memory Supported | Up to 512GB |
| Supported Chipset | Intel® C422 Workstation Chipset |
| PCH I/O | PCI Express* 3.0 – Up to 24 lanes<br>USB* 3.0 – Up to 10 ports<br>SATA* 3.0 – Up to 8 ports<br>DMI – Up to 4 lanes, Gen 3 |
| Intel® Manageability Engine (Intel® ME) | Intel® ME 11.11 with Intel® Active Management Technology (Intel® AMT) and Intel® vPro™ Technology |
| Intel® Rapid Storage Technology enterprise (Intel® RSTe) | Intel® RSTe 5.0 and Intel® Virtual RAID on Chip (Intel® VROC) |

AVAILABLE IN SINGLE-SOCKET CONFIGURATION ONLY

# INTEL® XEON® E PROCESSORS

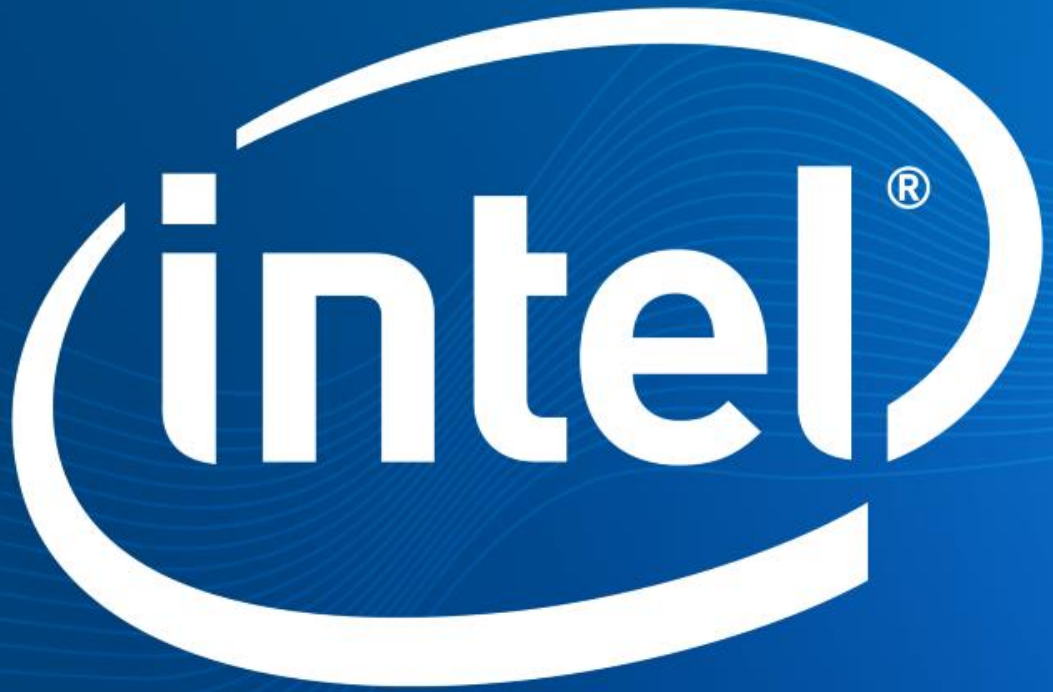
## ESSENTIAL PERFORMANCE AND VISUALS FOR ENTRY WORKSTATIONS




*Processor, chipset and diagram provided for illustration purposes only.*
*Diagram and table are not a comprehensive of all features and capabilities.*

| | |
|---|---|
| Processor Manufacturing Process | Intel's 14nm process technology |
| Maximum Core Count Supported | 6 |
| Maximum Base Frequency Supported | 3.8 GHz |
| Maximum Intel® Turbo Boost Technology 2.0 Frequency Supported | 4.7 GHz |
| Processor Cache Memory Support | Up to 12MB Intel® Smart Cache |
| Processor Performance Support | Intel® Turbo Boost 2.0 Technology, Intel® Hyper-Threading Technology (Intel® HT) |
| Processor Graphics Support | Available with integrated Intel® UHD Graphics P630 (Maximum Video Memory up to 64GB), supporting up to 3 display outputs) |
| Maximum Number of Processor Sockets Supported | One Socket |
| Thermal Design Point (TDP) | Up to 95 Watts |
| Socket Type | LGA-1151 Socket |
| System Memory Support | 2 channels of DDR4 ECC 2666 MHz 2 DPC |
| Maximum System Memory Supported | Up to 64GB |
| Supported Chipset | Intel® C246 Series Workstation Chipset |
| I/O | PCI Express* 3.0 – Up to 40 lanes (CPU + Chipset)<br>USB* 3.1 – Up to 6 ports<br>USB* 3.0 – Up to 10 ports<br>SATA* 3.0 – Up to 8 ports<br>DMI – Up to 4 lanes, Gen 3 |
| Intel® Manageability Engine (Intel® ME) | Intel® ME v12 with Intel® Active Management Technology (Intel® AMT) and Intel® vPro™ Technology |
| Intel® Rapid Storage Technology | Intel® Rapid Storage Technology PCIe* 3.0 |

AVAILABLE IN SINGLE-SOCKET CONFIGURATION ONLY


intel

# INTEL® INNOVATION DAY

## В РИТМЕ ТЕХНОЛОГИЙ