INTEL AI PORTFOLIO

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Outline: What students are expected to learn

- Intel vision for AI on PC

- Introduction to the Intel analytics ecosystem

- Introduction to the Intel hardware for training and inference

- Intel – from hardware to solutions

- Summary

Bring Your AI Vision to Life Using Intel® Comprehensive Portfolio

DATA
Intel analytics ecosystem to get your data ready

SOLUTIONS
Partner ecosystem to facilitate AI in finance, health, retail, industrial & more

TOOLS
Software to accelerate development and deployment of real solutions

HARDWARE
Multi-purpose to purpose-built AI compute from device to cloud

FUTURE
Driving AI forward through R&D, investments and policy

DATA

Intel analytics ecosystem to get your data ready

intel® AI

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	INTEGRATE	STORE	PROCESS	MANAGE	ANALYZE
SOURCE(S)? STRUCTURED? VOLUME? DURABILITY? STREAMING? LOCALITY? GOVERNANCE? OTHER?	Tool for **live streaming data ingestion** from Internet of Things (IOT) sensors in endpoint devices *e.g. Kafka*, Sqoop*, MQTT*, WS*, REST*, Flume**	**File**, **block** or **object**-based storage solution given cost, access, volume and performance requirements *e.g. Lustre*, IBM* Spectrum* Scale* (GPFS), Dell/EMC* Isilon*, MySQL* (OLTP), Tera*data* (EDW), AWS* S3* (ODS), HDFS* (No-SQL), Hbase* (In-Mem DB)*	**Integration, cleaning, normalization and other** transformations on batch and/or streaming data *e.g. Hadoop* MapReduce*, Apache* Storm*, Beam**	**Job scheduling** and **storage management** framework for distributed computation in various domains *e.g. SLURM*, PBS*, YARN*, Mesos*, Kubernetes**	Applications in **HPC, Big Data, HPDA, AI** & more that have access to a common compute and data pool *e.g. MPI*, SHMEM*, Hadoop*, Spark*, Apache*, Flink*, TensorFlow*, MXNet**

*Other names and brands may be claimed as the property of others. Non-exhaustive list of offerings in each category.

HARDWARE

Multi-purpose to purpose-built
AI compute from device to cloud

END POINT	EDGE	DATA CENTER

User-touch end point devices with lower power requirements such as laptops, tablets, smart home devices, drones

Small scale data centers, small business IT infrastructure, to few on-premise server racks and workstations

Large scale data centers such as public cloud or comms service providers, gov't and academia, large enterprise IT

Varies to <1ms — <5ms — <10-40ms — ~100ms
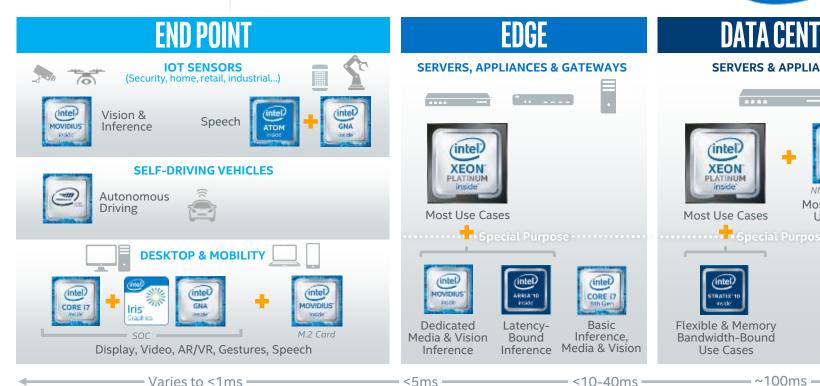
All products, computer systems, dates, and figures are preliminary based on current expectations, and are subject to change without notice.

AI IS EXPANDING

HARDWARE

Multi-purpose to purpose-built
AI compute from device to cloud

(intel) AI

END POINT

IOT SENSORS
(Security, home, retail, industrial...)

intel MOVIDIUS inside — Vision & Inference

Speech — intel ATOM inside ➕ intel GNA inside

SELF-DRIVING VEHICLES

Autonomous Driving

DESKTOP & MOBILITY

intel CORE i7 inside ➕ intel Iris Graphics ➕ intel GNA inside ➕ intel MOVIDIUS inside

SOC   M.2 Card

Display, Video, AR/VR, Gestures, Speech

Varies to <1ms

EDGE

SERVERS, APPLIANCES & GATEWAYS

intel XEON PLATINUM inside

Most Use Cases

➕ Special Purpose

intel MOVIDIUS inside — Dedicated Media & Vision Inference

intel ARRIA 10 inside — Latency-Bound Inference

intel CORE i7 8th Gen — Basic Inference, Media & Vision

<5ms   <10-40ms

DATA CENTER

SERVERS & APPLIANCES

intel XEON PLATINUM inside

Most Use Cases

➕ intel NERVANA inside COMING 2019

NNP-L / NNP-I

Most Intensive Use Cases

➕ Special Purpose

intel STRATIX 10 inside

Flexible & Memory Bandwidth-Bound Use Cases

~100ms

[1]GNA=Gaussian Neural Accelerator
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ONE SIZE DOES NOT FIT ALL

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ARTIFICIAL INTELLIGENCE

SOLUTIONS
Solution Architects

ARTIFICIAL INTELLIGENCE

AI Solutions Catalog (**Public** & **Internal**)

Platforms | Finance | Healthcare | Energy | Industrial | Transport | Retail | Home | More...

TOOLKITS
App Developers

DEEP LEARNING DEPLOYMENT

OpenVINO™ *†*
Open Visual Inference & Neural Network Optimization toolkit for inference deployment on CPU, processor graphics, FPGA & VPU using TF, Caffe* & MXNet*

Intel® Movidius™ SDK
Optimized inference deployment for all Intel® Movidius™ VPUs using TensorFlow* & Caffe*

DEEP LEARNING
Intel® Deep Learning Studio‡
Open-source tool to compress deep learning development cycle

COMING SOON!

LIBRARIES
Data Scientists

MACHINE LEARNING LIBRARIES

Python
• Scikit-learn
• Pandas
• NumPy

R
• Cart
• Random Forest
• e1071

Distributed
• MlLib (on Spark)
• Mahout

DEEP LEARNING FRAMEWORKS

Now optimized for CPU

TensorFlow* | MXNet* | Caffe* | BigDL/Spark*

Optimizations in progress

Caffe2* | PyTorch* | PaddlePaddle*

COMING SOON!

FOUNDATION
Library Developers

ANALYTICS, MACHINE & DEEP LEARNING PRIMITIVES

Python
Intel distribution optimized for machine learning

DAAL
Intel® Data Analytics Acceleration Library (for machine learning)

MKL-DNN   **clDNN**
Open-source deep neural network functions for CPU, processor graphics

DEEP LEARNING GRAPH COMPILER

Intel® nGraph™ Compiler (Alpha)
Open-sourced compiler for deep learning model computations optimized for multiple devices (CPU, GPU, NNP) using multiple frameworks (TF, MXNet, ONNX)

HARDWARE
IT System Architects

AI FOUNDATION

ATOM | CORE 8th G | XEON PLATINUM

Data Center
Edge
Device

DEEP LEARNING ACCELERATORS

NERVANA *COMING 2019*
NNP L-1000

STRATIX 10 | ARRIA 10 | MOVIDIUS | GNA

← Inference →

† Formerly the Intel® Computer Vision SDK
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Summary

- Intel has technology in Data Center, Cloud, and PC to support AI.

1. Hardware

2. Tools

3. Solutions

Capabilities highlighted:
- HW CPU – i7 Core 8th Gen, i7-8550U (CFL)
- HW CPU – i7 Core 8th Gen i7-8565U (WKL)
- Intel Integrated GPU – HD graphics
- Camera, Movidius Neural Compute Stick
- WinML via Microsoft Windows 10 – 64 bit
- OpenVINO™ Toolkit, Intel Dist. of Python
- IDE: Visual Studio Community Ed. 2017
- TensorFlow with Tutorials, Labs

- Intel is positioning the PC as a critical AI engine at the edge.

Intel
experience
what's inside™