#### **Smarter technology for all**

## Wszystko zaczyna się od przetwarzania danych – fundamentu AI – dlaczego inteligentna infrastruktura Lenovo z procesorami Intel® ma znaczenie?

#### Łukasz Borkowski

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## **Bi-Model Challenge of an IT Organization**





## **Bi-Model Challenge of an IT Organization**





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# The Lenovo Solution Alfor Al

## Bring AI to your data where and when you need it the most – from pocket to the cloud – with a hybrid approach



## intel

Lenovo

A new wave of Al innovation drives competitive advantage for businesses across many vertical markets.

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## Lenovo Al helps you transform your business.

Improve productivity and deliver more profitability using smarter AI solutions.

#### The Importance of AI

A

- Improved speed of business
- Better customer service
- Improved monitoring
- Better quality and reductions of human error

intel

Xeon

PLATINUM

#### Supporting the implementation of AI

- **Better Deployments**  $\checkmark$
- **Choice of Application Partners**
- Edge-to-Cloud AI Solutions
- ✓ IT Orchestration and Management

#### **Right Products**

#### **Al Ready Platforms**



**Right Ecosystem** 

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#### **Right Ecosystem**

#### Lenovo **Al Innovators**

Partnering with 46 and growing bestin-class AI software companies



#### Your Al Partner for Scale



it takes a ecosystem to deploy cognitive solutions that deliver business value.



165+

**Enterprise AI** 

Solutions





Complementing cutting edge tech with world class supply and supports chains

-| | ≪



Combined AI expertise across technology stacks. industries and research

Support from PoC to Blitzscale, locally or worldwide

## **Our Strong Partnership Contribution**

Bring AI Everywhere with Intel®



Multi-Year Investments

Al Partner Ecosystem Latest Technology Foundation

+60 AI ready Intel powered Lenovo products Customer Support Program

Proof of Concept Engineering Benchmarks Budapest Briefing Center

Bringing AI everywhere

## intel

Bring AI Everywhere with Intel<sup>®</sup>

## Intel AI portfolio

oneAPI

intel.

Xeon

MAX SERIES

intel.

intel

Xeon

AGILEX

intel

GPU

intel.

FLEX SERIES

**ethernet** 

intel

intel.

Xeon

intel core

ULTRA

intel core

Gaudi

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Medium to Small Scale

Training and Fine Tuning

Parallel Compute, HPC, AI for HPC, Data Center

intel.

**ethernet** 

General Acceleration

Open Software

Deep Learning

Acceleration

Environment

intel Al Visual Inference, VDI, Media Analytics GPU FLEX SERIES

Latency, and Sparse Inference

intel.

ARC

GRAPHICS

Dedicated Deep Learning Training and Inference

**OpenVINO** 

Real-Time, Medium Throughput, Low

Inference

General Purpose



intel.

Xeon

intel.

**GPU** 

intel.

MAX SERIES

Xeon

intel.

Xeon

Flexible Solution Maximize Usage and TCO\*

Flex

Bring AI Everywhere with Intel<sup>®</sup>

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## Intel® Data Center GPU Flex Series

Flex

Al inferencing & virtual desktop infrastructure Industry's 1<sup>st</sup> hardware-based AV1 encoder in a data

applications: media processing & delivery, cloud gaming,

Industry's most open, robust, general-purpose GPU for

Unprecedented flexibility to handle a wide range of

the intelligent, visual cloud

center GPU, delivering 5x media transcode throughput performance<sup>1</sup>

Built on the foundation of oneAPI for unified programming across heterogeneous architectures

Cloud Gaming, Virtual Desktop Infrastructure, Media Delivery, and AI Inference

intel. Data center GPU

FLEX SERIES

1. For workloads and configurations visit <u>www.Intel.com/PerformanceIndex</u>. Results may vary. \* TCO = Total Cost of Ownership

#### Lenovo Al Discover

Center of Excellence

MORRISVILLE

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**E** 

BEIJING

#### In the Lenovo AI Center of Discovery & Excellence

Proof of Technology | Workshops | Partner Collaboration | Benchmarking | Best Practices Data Scientists | AI Architects | Engineers | Suppliers | Software Partners | Industry Consortiums



#### Get started faster with 165+ Lenovo Al Innovators Solutions

	Ð			
Finance	Healthcare	Manufacturing	Retail	Smart Cities
<ul> <li>Credit decisions</li> <li>Fraud detection &amp; Threat Intelligence</li> <li>Risk management</li> <li>Algorithmic trading</li> <li>Process automation</li> <li>Personalized banking / customer service &amp; sales automation</li> <li>Regulatory intelligence</li> <li>IT automation</li> </ul>	<ul> <li>Medical Imaging / diagnosis treatment</li> <li>Clinical decisions support (CDS)</li> <li>Customer service agents</li> <li>Process &amp; back office automation</li> <li>Inventory management, supply chain &amp; logistics</li> <li>IT automation</li> </ul>	<ul> <li>Predictive Maintenance / Digital Twin</li> <li>Quality Control / Visual Inspection</li> <li>Demand forecasting</li> <li>Inventory management, supply chain &amp; logistics</li> <li>Production line, robotics &amp; process optimization</li> <li>IT automation</li> </ul>	<ul> <li>Loss Prevention</li> <li>Logistics / Shelf restocking</li> <li>Omni-channel analytics &amp; engagement / sales automation</li> <li>Check-out automation</li> <li>Shopping recommendation &amp; merchandising</li> <li>Transaction payment systems</li> <li>IT automation</li> </ul>	<ul> <li>Crowd Management and Analytics</li> <li>Distributed Edge and large scale Orchestration</li> <li>Security and Access Management</li> <li>Traffic control and smart policing.</li> <li>Public Health and Safety</li> </ul>
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#### Examples of new Al-ready solutions with our Al Innovators

## intel



Al Humans promote products and offer guidance to customers using an Al kiosk

Reduces unplanned downtime with AI with up to 14 days of advanced prediction

Monitors people within a space, communicates with guests to regulate traffic, and shares info

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## Al From Far Edge to Core – Bringing Al to the Data ThinkEdge



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## Lenovo extends Desk to Data Center to Cloud portfolio

## intel

AI Workstations	<b>S</b>	Machine Learning Deep Learning, Retraining and Analytics LLM for GenAl			Retraining, enAl
	4 Granuso 5 Granuso		Control of the second sec		NEW AI Optimized
					SR680a V3
Mobile Workstation P920, P720		SR850 V3, SR860 V3 SR650 V3 ThinkAgile MX, VX	•	SD660-I V3 SR670 V2 (4xSXM / 8xP SR680a V3 (8x SXM/OA	Cle GPUs) M GPUs)
Diverse Portfolio	Highest Performance	Flexible Deployment	Energy Efficient	Trusted Reliability	Validated Secure

#### Lenovo extends ThinkEdge portfolio, delivering Edge AI solutions

Capgemini 🔿

intel

Expanding Lenovo ThinkEdge Portfolio

Introducing ThinkEdge SE450 for Multiple AI Workloads

> Enhancing Lifecycle Management for Remote Sites

Advancing edge capabilities with best-in-class AI-ready technology

New ThinkEdge SE450 Lenovo

Enabling thousands of ISVs with our Partner Ecosystem

byte LAKE

— Microsoft

THE EDGE

COMPANY

Red Hat

everseen



New Edge AI Solutions for

**Smarter Manufacturing** 

**Smarter Retail** 

**Smarter Cities** 

Smarter Telecom

**vm**ware<sup>\*</sup>

Lenovo

## Introducing ThinkSystem SR680a V3



An 8U, two-socket system optimized for massive computational performance with Intel processors and choice of GPUs

intel

Xeon

PLATINUM



#### Ideal for both AI and HPC

- Al Workloads: Model development, • training and retraining, Machine Learning, Deep Learning, LLMs
- HPC workloads: Modeling and simulation, rendering, financial tech, scientific research

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	•	Supports 5 <sup>m</sup> generation of Intel <sup>®</sup> Xeon <sup>®</sup> Scalable Processors			
rmance	ce ·	Maximum GPU Performance with NVIDIA, and AMD's latest GPUs & accelerators			
	•	<b>Fastest transfer rate with</b> NVIDIA NVLink and AMD's Infinity Fabric			

Flexible

Perfo

- Support for AMD MI300X, NVIDIA H100/H200 and future GPUs
- Sufficient Thermal Headroom for future higher-power GPUs

Ease of Deployment

- Lenovo XClarity System Management software improves the efficiency of your infrastructure deployment
- Fits into industry-standard 19-inch racks

#### **Al-optimized Portfolio from Model Development to Inferencing**

80+ new and enhanced Infrastructure platforms – Pocket to Cloud, Edge to Core



## intel + Lenovo

## ThinkEdge is Revolutionizing Manufacturing

#### Powerful

#### Secure + Reliable

Versatile

Rugged



Quiet



New Technologies are Helping Address Challenges

The intelligent data produced by AI, Machine Learning, and IoT devices is helping to create more automated, flexible, and cost-efficient production environments. Of manufacturers say they've implemented some form of AI into their operations

Rootstock

85%

/0%

Of industrial manufacturing firms are implementing or have already implemented IoT HFS Research

75%

Of large enterprises will use intralogistics smart robots in their warehouses by 2026

<u>Gartner</u>

#### **Powering Smart Manufacturing with Edge Computing**

Edge computing with Lenovo and Intel are ushering in a new era of manufacturing innovation. Powered by the latest Intel processors, Lenovo's ThinkEdge solutions enable real-time data processing and analysis at the edge in a durable, compact, and secure design tailored for diverse manufacturing environments.



#### THINKEDGE ADDRESSES MANUFACTURING PAIN POINTS



Real-Time Inventory Tracking

Lenovo

intel

Enhanced Equipment Lifespan Increased Production Automation

## The ThinkEdge Portfolio



Powerful
I Versatile
Rugged
Secure + Reliable
(I) Quiet
Scalable
Discrete
Cutting-Edge

## Edge Computing Use Cases in Manufacturing





## Edge Computing in Quality Control

**Use case:** Real-Time Defect Detection in Assembly Lines

**Example:** Cameras and AI models are used to inspect parts as they move along the assembly line. Edge computing systems can detect defects such as scratches, dents, or misalignments in real-time.

**Benefit:** Immediate correction or removal of non-uniform items from the production line, reducing the likelihood of defective products reaching the customer and minimizing rework costs.



## Edge Computing in Quality Control

Use case	Example	Benefit
Real-Time Monitoring of Production Conditions	IoT sensors can immediately detect any deviations from the optimal conditions that could affect product quality. Edge computing is used to monitor critical production parameters such as temperature, humidity, and pressure.	Enables real-time adjustments to maintain consistent product quality, reducing the risk of producing off-spec products and ensuring compliance with safety standards.
Precision Measurement & Tolerance Checking	Edge computing devices can be used to measure components with high precision, ensuring they meet specified tolerances. For example, edge devices can analyze data from laser measurement systems to verify the dimensions of semiconductor wafers.	Ensures that only components that meet exact specifications proceed to the next production stage, enhancing product consistency and reducing waste.
Automated Visual Inspection Systems	Automated visual inspection systems are being used to check the surface quality of finished products such as smartphones or laptops. The robust processing power of edge computing servers can quickly process large datasets from visual systems and AR/VR.	Ensures a higher throughput and consistent quality inspection, leading to fewer defective products reaching customers and improving overall customer satisfaction.



## Edge Computing in Predictive Maintenance

**Use case:** Vibration Monitoring in Rotating Equipment

**Example:** IoT devices installed on motors, pumps, or turbines monitor vibration patterns continuously.

Edge computing clients analyze the data locally to detect anomalies that may indicate potential mechanical failures, such as misalignment or bearing wear.

**Benefit:** By identifying issues early, maintenance can be performed before catastrophic failures occur, reducing downtime and repair costs.



## Edge Computing in Predictive Maintenance

Use case	Example	Benefit
Oil Quality Monitoring in Hydraulic Systems	Edge devices analyze the condition of hydraulic oil by monitoring parameters such as viscosity, contamination, and moisture levels. This analysis helps predict when the oil needs to be changed or when the system might fail.	Extends the lifespan of hydraulic systems, reduces maintenance costs, and improves machine reliability.
Temperature and Pressure Monitoring in Boilers	Smart sensors connected to boilers measure temperature and pressure levels in real-time. Edge computing can help predict potential overheating or pressure spikes that might lead to equipment failure or safety hazards.	Ensures the safe operation of boilers and other critical equipment, minimizing the risk of accidents and unplanned shutdowns.
Wear and Tear Analysis on Conveyor Belts	Smart sensors on conveyor belts monitor wear and tear, detecting issues like belt misalignment, surface wear, or motor strain. Edge devices process this data to predict when maintenance should be scheduled.	Prevents unexpected conveyor belt failures, which can cause significant production delays and financial losses.





## Edge Computing in Supply Chains

Use case: Real-Time Shipment Monitoring

**Example:** Smart devices are attached to shipments to monitor environmental conditions like temperature, humidity, and vibration during transit.

Edge computing clients can process and transmit environmental data to supply chain managers in real-time, allowing them to take corrective action if conditions deviate from acceptable ranges.

**Benefit:** Protects the quality of sensitive goods, reduces the risk of spoilage or damage, and ensures timely delivery.



## **Edge Computing in Supply Chains**

Use case	Example	Benefit
Inventory Management and Tracking	<ul> <li>RFID readers and IoT sensors are deployed in warehouses and production facilities to track inventory levels and movement in real-time.</li> <li>Edge computing gathers data from readers, sensors, and Warehouse Management Systems (WMS) to trigger automated replenishment orders when stock levels are low.</li> </ul>	Provides improved supply chain visibility, enabling automatic reordering or redistribution of materials, while optimizing warehouse operations.
Supplier Performance Monitoring	Edge computing is used to monitor the performance of suppliers by tracking delivery times, quality of materials, and adherence to schedules. Data from multiple suppliers is processed at the edge to provide real- time insights into supplier reliability and performance.	Improves supplier relationships, enhances the quality of incoming materials, and allows for quicker adjustments to the supply chain when issues arise.
Logistics and Fleet Management	Smart sensors installed in delivery trucks and other vehicles collect and process data on vehicle location, fuel consumption, and driver behavior in real-time. Real-time data from edge computing is used to optimize delivery routes, monitor vehicle health, and ensure timely deliveries.	Reduces transportation costs, improves delivery times, and enhances overall fleet efficiency.



## Edge Computing in Digital Twins

**Use case:** Production Process Simulation

**Example:** A digital twin of an entire production process is created, including data from machines, materials, and environmental conditions.

Edge computing servers process this data in real-time, enabling the digital twin to simulate different production scenarios, optimize workflows, and identify potential bottlenecks or inefficiencies.

**Benefit:** Optimizing production processes in real-time increases throughput, reduces waste, and improves overall efficiency.

## **Edge Computing in Digital Twins**

Use case	Example	Benefit
Machine Performance Monitoring & Optimization	A digital twin of a CNC machine on the manufacturing line is created using real-time data from sensors embedded in the machine. Edge computing devices process this data locally to monitor performance metrics such as vibration, temperature, and tool wear.	Real-time monitoring and simulation improve machine performance, reduce wear and tear, and minimize the risk of unexpected downtime.
Quality Control & Defect Protection	A digital twin of a manufacturing process is integrated with edge devices that monitor product quality in real-time. The digital twin simulates the impact of various factors on product quality, such as changes in material properties or environmental conditions, to predict potential defects and suggest corrective actions.	Early detection and prevention of defects lead to higher product quality, reduced waste, and lower costs associated with rework or recalls.
Worker Safety & Ergonomics	A digital twin of a manufacturing facility includes data on worker movements, equipment usage, and environmental conditions. Edge computing provides greater analyzation of data gathered from the digital twin to simulate the impact of different ergonomic practices and safety protocols.	Enhanced worker safety and ergonomics lead to fewer accidents, lower healthcare costs, and improved worker satisfaction and productivity.

## ThinkEdge and Intel<sup>®</sup> in action

intel

Lenovo

Ducati is excelling on and off the racetrack





#### The Challenge

Ducati Corse's engineering team works tirelessly to put its riders in first on the racetrack – and first in the race for the best technology. By developing tools that extract more effective insights and apply them sooner than competitors, Ducati can gain an advantage that sets it ahead of the pack.

#### **The Solution**

Ducati deployed a suite of Lenovo solutions, including the ThinkEdge SE350 servers backed by Intel<sup>®</sup> processors. At the Ducati Corse headquarters, the company houses Lenovo HPC infrastructure, featuring built-in AI acceleration for edge workloads and optimization for faster data analytics. On this infrastructure, the Ducati team runs complex simulations that help optimize every component of the racing bikes and race day strategies.

#### The Result

"It is thanks to Lenovo data analytics, artificial intelligence, and smart collaboration solutions that our engineers can make the best MotoGP bikes in the world," said Gabriele Conti, Electronic Systems Director, Ducati Corse.





Smarter technology for all

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