Investor Webinar

DCAI Business Update

John Pitzer

Corporate Vice President
Investor Relations

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Disclosures and Forward-Looking Statements

- Future node performance and other metrics, including power and density, are projections and are inherently uncertain and, in the case of other industry nodes, are derived from or estimated based on publicly available information. Intel's node numbers do not represent the actual dimension of any physical feature on a transistor or structure. They also do not pinpoint a specific level of improvement in performance, power or area, and the magnitude of a decrease from one node number to the next is not necessarily proportionate to the level of improvement in one or more metrics. Historically, new Intel node numbers were based solely on improvements in area/density; now, node numbers generally reflect a holistic assessment of improvement across metrics and can be based on improvement in one or more of performance, power, area, or other important factors, or a combination, and will not necessarily be based on area/density improvement alone.
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- Unless specifically indicated otherwise, the forward-looking statements in this presentation do not reflect the potential impact of any divestitures, mergers, acquisitions, or other business combinations that have not been completed as of the date of this presentation. Such statements involve many risks and uncertainties that could cause actual results to differ materially from those expressed or implied in these forward-looking statements. Important factors that could cause actual results to differ materially are set forth in Intel's earnings release dated January 26, 2023, which is included as an exhibit to Intel's Form 8-K furnished to the SEC on such date, and in Intel's SEC filings, including the company's most recent reports on Forms 10-K and 10-Q, such as changes in product demand or product mix, the complexity of our manufacturing operations, competition, investments in R&D and our business, products, and technologies, vulnerability to product and manufacturing-related risks, the effects of the COVID-19 pandemic, supply chain risks, cybersecurity and privacy risks, investment and transaction risk, evolving regulatory and legal requirements, and the risks of our global operations, among others. Copies of Intel's SEC filings may be obtained by visiting our Investor Relations website at www.intc.com or the SEC's website at www.sec.gov.
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Presenters

Sandra Rivera

Executive Vice President
General Manager,
Data Center & AI Group

Greg Lavender

Senior Vice President, CTO
General Manager, Software and
Advanced Technology Group

Lisa Spelman

Corporate Vice President
General Manager,
Xeon Products

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DCAI Business Update Webinar

Data Center TAM Update: Sandra Rivera

Roadmap Update: Sandra Rivera & Lisa Spelman

Winning in AI: Sandra Rivera & Greg Lavender

Wrap Up and Q&A: Sandra Rivera

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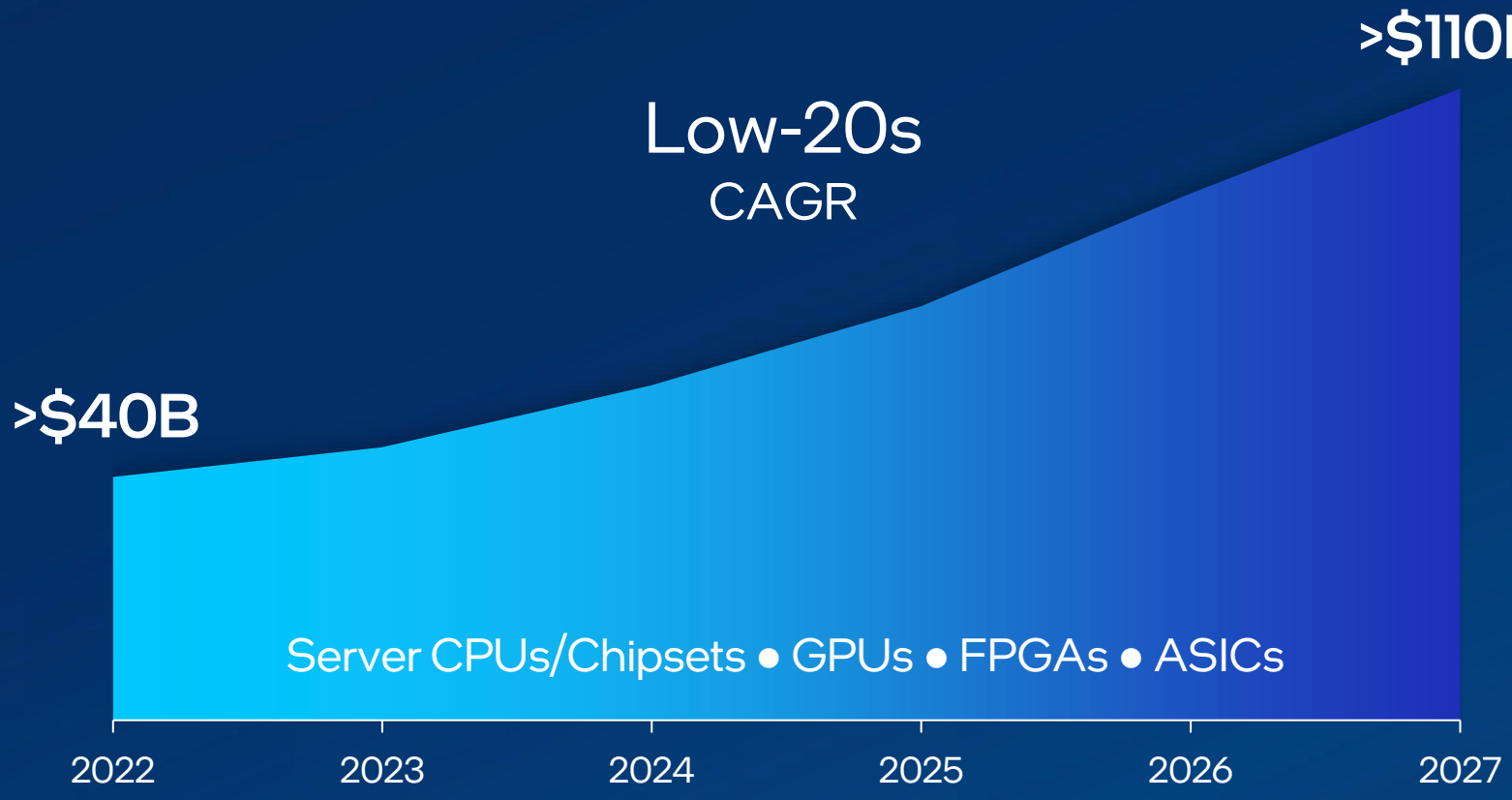
DCAI Silicon TAM Opportunity



Source: Intel forecast based on amalgamation of analyst data and internal analysis

Primary TAM Drivers

1. Growth in heterogeneous computing
2. Growth in AI, networking, security and other strategic workloads

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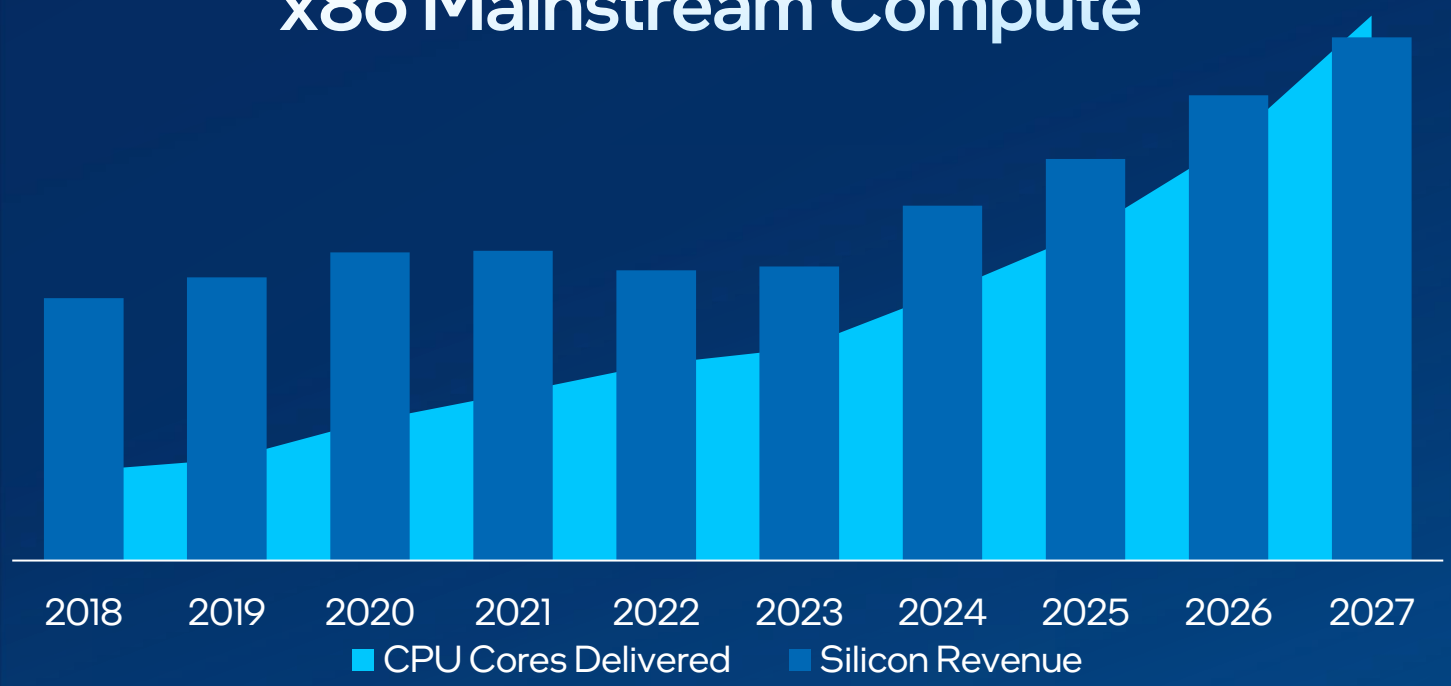
Silicon Revenue Will Follow CPU Core Trends

x86 Mainstream Compute



Source: Intel forecast based on amalgamation of analyst data and internal analysis

- Compute demand has strong growth trajectory
- Xeon core growth increasing at a faster rate than previous generations
- Delivering customer value through CPU cores, built-in acceleration & heterogenous computing

Mainstream Compute Cores Growing at Mid-20s CAGR

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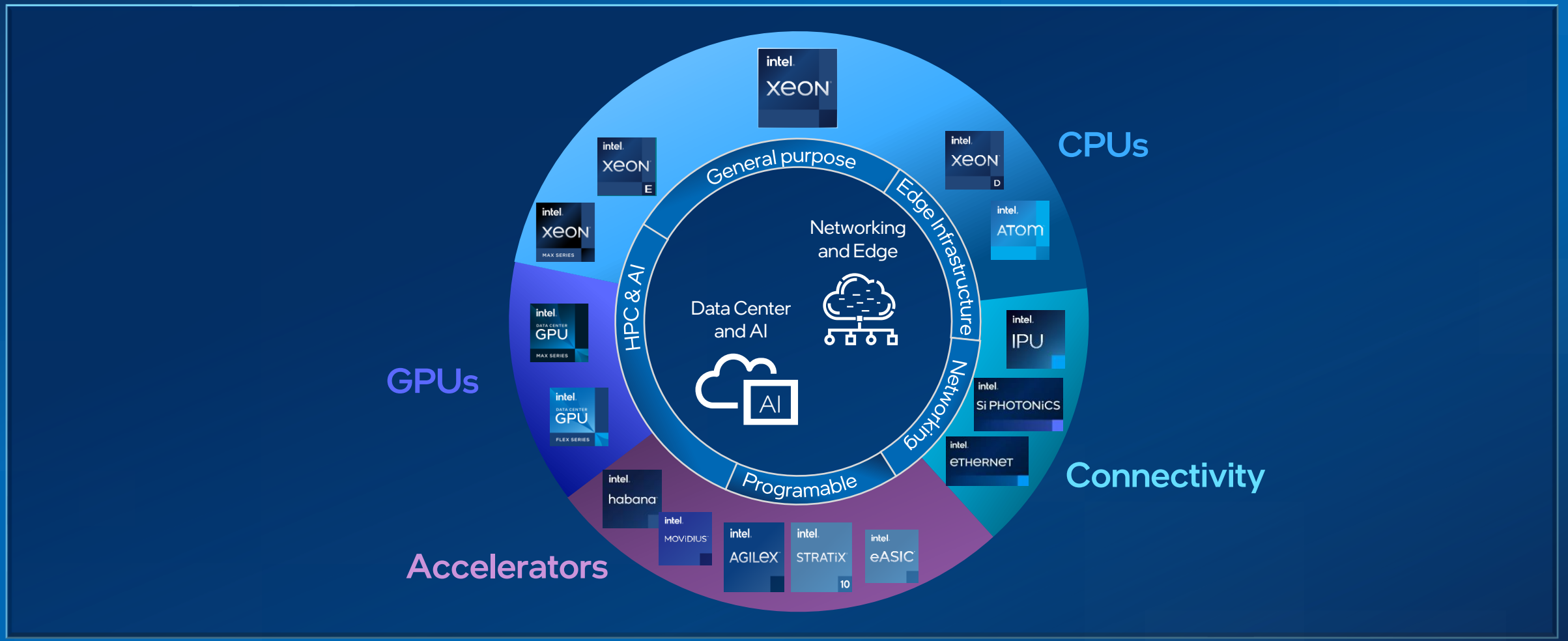
Delivering the Broadest Portfolio

Driving Innovation from the Cloud, through the Network to the Intelligent Edge



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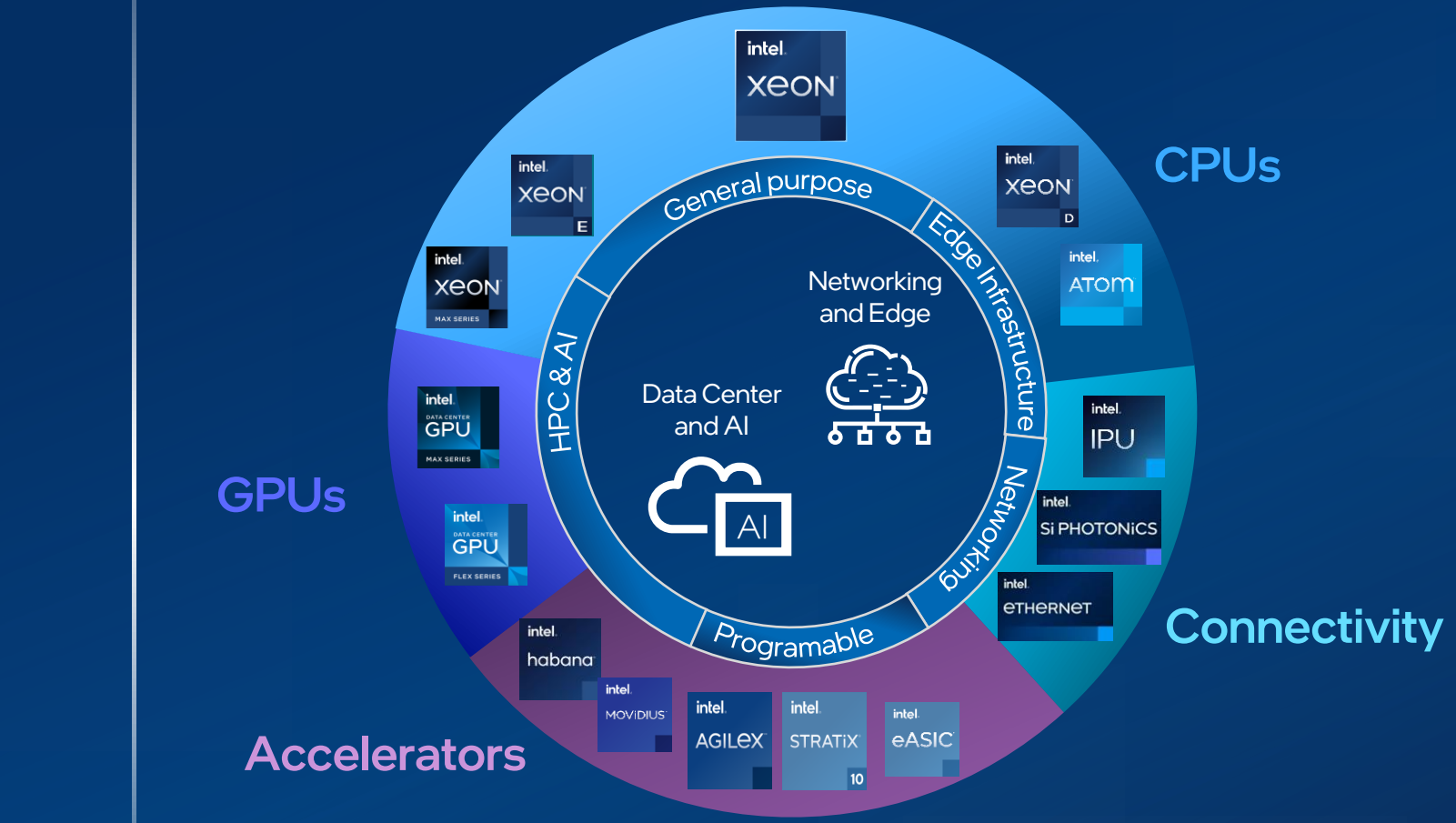
Delivering the Broadest Portfolio

Driving Innovation from the Cloud, through the Network to the Intelligent Edge

oneAPI

Single code base across multiple architectures



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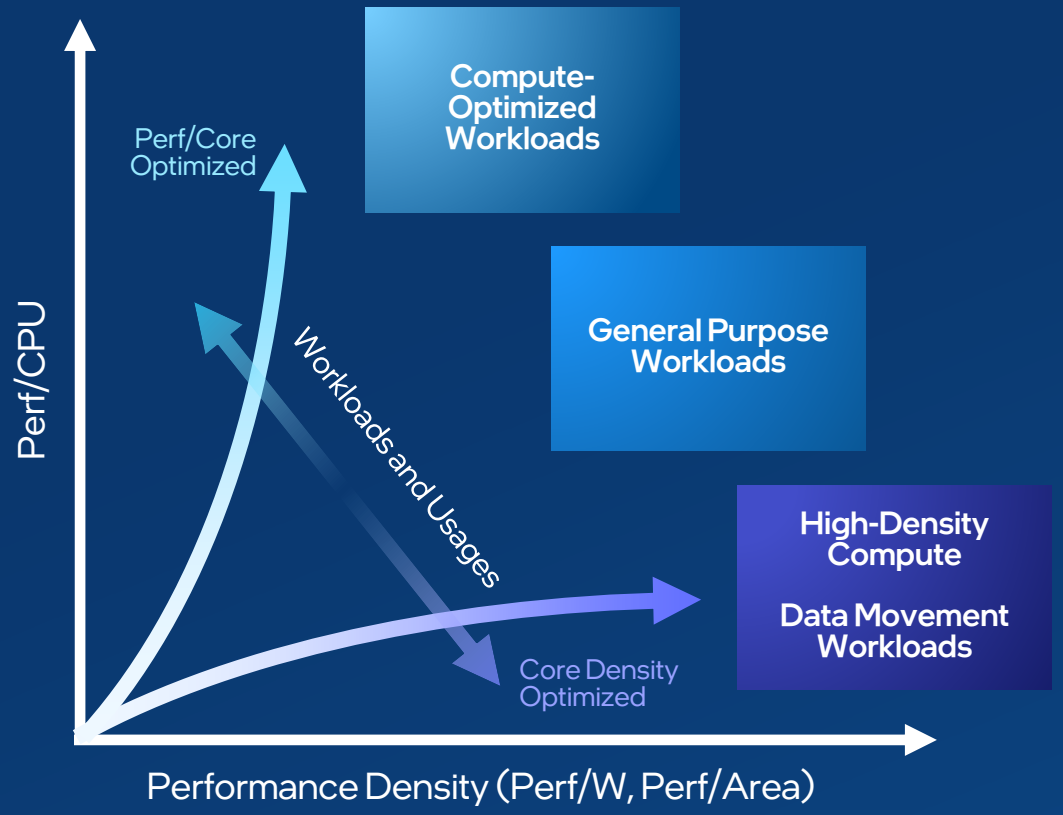
Data Center Infrastructure Requirements Evolving



- Different requirements driving $TCO
  Perf/Core, Perf/Watt, Perf/VM, Perf/Socket
- Continued demand for high-core performance
- Growing demand for cores that deliver highest performance-per-watt

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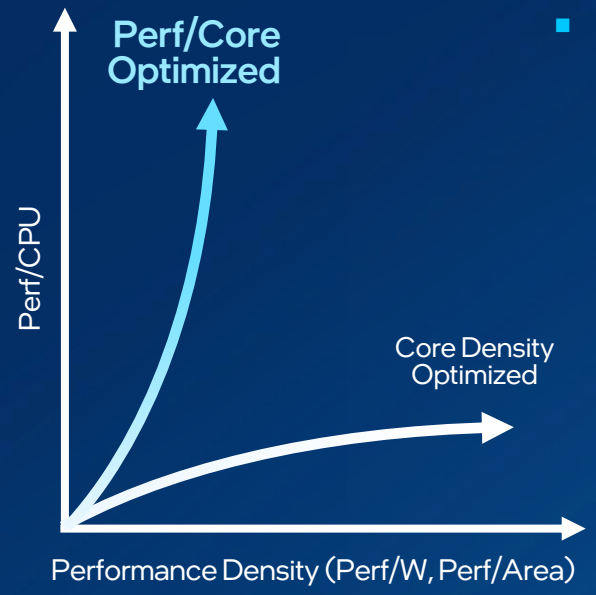
CPUs Optimized for Mainstream Compute

P-core

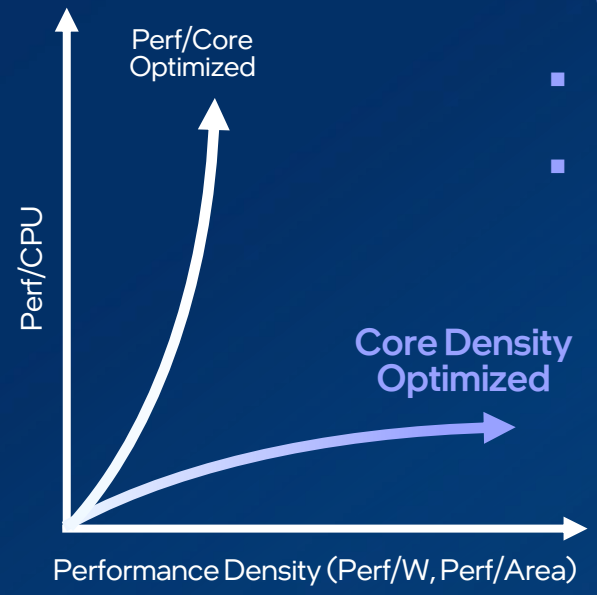
- High-core performance
- Workload-optimized performance with built-in accelerators



Optimized for Performance

E-core

- Performance-per-watt optimized
- High-core density
- High-throughput performance



Optimized for Efficiency

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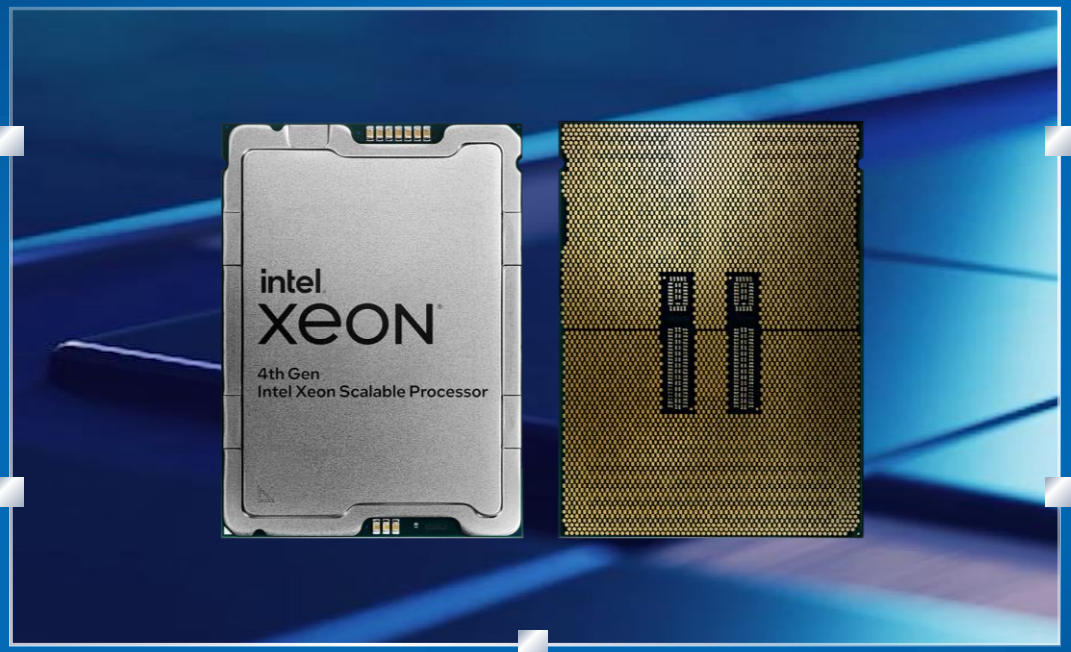
4th Gen Intel® Xeon®
Arrives with Strong Customer Adoption

450+
DESIGN WINS
The most ever for any Xeon family

200+
DESIGNS SHIPPING TODAY
Most ever on embargo lift/intended shipping day



50+
ALL MAJOR OXMS* SHIPPING
* Original equipment manufacturers + original design manufacturers

Top 10
Global CSPs* deploying now and throughout 2023
* Cloud service providers

Supply
Meeting customer demand today and healthy throughout 2023

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5th Gen Intel Xeon Scalable Processors

Formerly codenamed "Emerald Rapids"

Sampling today, on schedule to deliver in Q4 2023

High-quality silicon

Volume validation underway

Higher performance-per-watt in same power envelope

Increased gen-on-gen core density

Same platform as 4th Gen Xeon

Easy migration path, from previous generation

Intel® Xeon® Processors codenamed Granite Rapids

On schedule to deliver in 2024, closely following Sierra Forest

Excellent silicon health

Hitting all major engineering milestones

Performance optimized

First P-Core Xeon on Intel 3

Platform improvements

Increased core density, memory & I/O innovations

DELL Technologies

"As the market leader in this segment, our focus is on strategic adoption of new technologies that keep us ahead of the curve and in front of the competition. **The initial platform progress we are seeing with Intel's Sierra Forest is fueling our confidence and invigorating that mission."**

Dave Lincoln
VP of Networking & Emerging Server Solutions

Hewlett Packard Enterprise

"For decades, HPE and Intel have collaborated on engineering projects to usher in advanced performance and efficiency for a number of enterprise workloads. Combining our forces is what keeps our industry moving forward. We are pleased to continue that strong collaboration and help play a role in influencing the design and architecture of **Granite Rapids, Intel's future-generation processor. We look forward to welcoming Intel's upcoming innovation**."

Krista Satterthwaite
Senior Vice President and General Manager, Mainstream Compute, at HPE

Lenovo

"Leveraging Lenovo's established in-house design and manufacturing strategy and Intel's deep engineering capability, **the future platform based on Intel's Granite Rapids processors booted in record time. This was one of the fastest and most efficient power-on implementations we have experienced** and we are excited to deliver this new emerging technology faster to further enable our customers' digital transformations."

Kamran Amini
Vice President and General Manager of Server & Storage, Lenovo Infrastructure Solutions Group

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Intel® Xeon® Processor codenamed Sierra Forest

First Xeon processor with Efficient-core (E-Core)

Sampling today, shipping 1st half of 2024

Excellent silicon health

Silicon power-on;

Operating systems booted in <18 hours

Lead vehicle for Intel 3

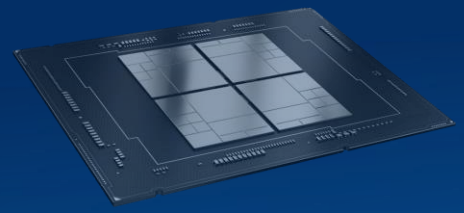
144 processor cores

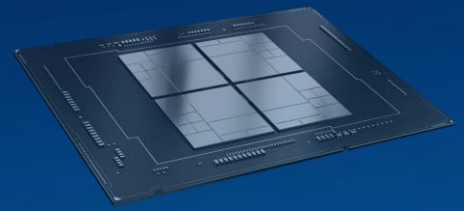
New class of Xeon

Built for cloud-optimized workloads

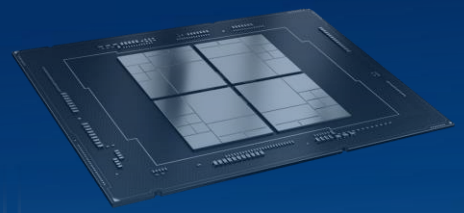
Executing on Our Xeon Roadmap

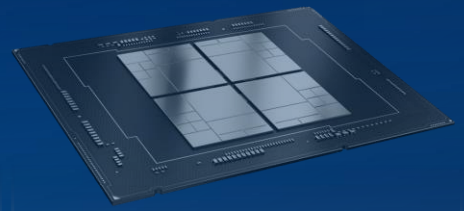
CPU P-Core





CPU E-Core

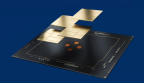




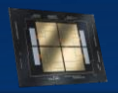
4th Gen Intel® Xeon® Scalable processors	5th Gen Intel® Xeon® codenamed Emerald Rapids	Next-Gen Intel® Xeon® codenamed Sierra Forest	Next-Gen Intel® Xeon® codenamed Granite Rapids	Next-Gen Intel® Xeon® codenamed Clearwater Forest
Today	Q4 2023	2024 (First Half)	2024 (closely following Sierra Forest)	2025

DCAI Architecture Evolution

CPU P-Core

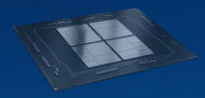


4th Gen Intel® Xeon® Scalable processors



Intel® Xeon® CPU Max Series

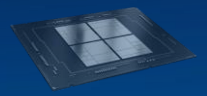
5th Gen Intel® Xeon®
codenamed Emerald Rapids



Intel® Xeon® Processors
codenamed Granite Rapids

CPU E-Core

Intel® Xeon® Processor
codenamed Sierra Forest



Intel® Xeon® Processor
codenamed Clearwater Forest

GPU

Intel® Data Center GPU Flex Series
codenamed Arctic Sound-M

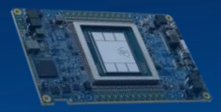
Intel® Data Center GPU Max Series
codenamed Ponte Vecchio

Intel® Data Center GPU Flex Series
codenamed Melville Sound

Next-Generation Accelerator Architecture
Codename: Falcon Shores

Dedicated AI

Habana® Gaudi® 2



Habana® Gaudi® 3

Next-Generation Accelerator Architecture

FPGA

intel. STRATIX 10

intel. eASIC

intel. AGILEX

15 new FPGAs on schedule to PRQ in 2023

intel. eASIC

intel. AGILEX

Next Gen FPGAs

Roadmap: 2023-2025

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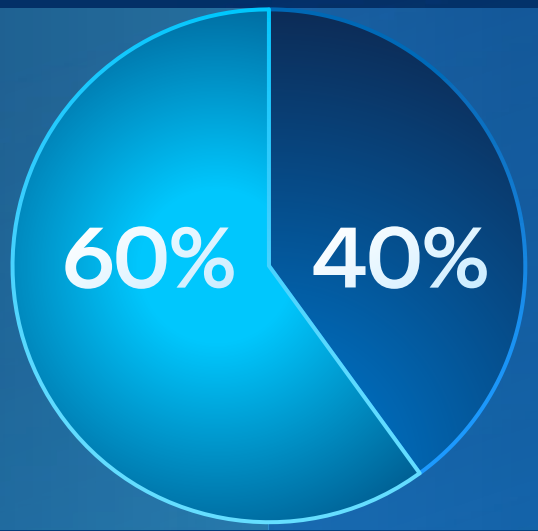
AI Accelerator Opportunity

>$40B Logic Silicon TAM by 2027*

AI Silicon

General Compute

- Primarily managed by CPUs
- Processing, ingesting, management and movement of data
- Small- to medium sized AI models



Accelerated Compute

- Serviced today by GPUs and special accelerators
- Large models (>100B parameters)

Demand for General Compute and Accelerated Compute Growing with the Market

*Source: Intel forecast based on amalgamation of analyst data and internal analysis

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Using AI to Accelerate Internet Video

Video Processing

Content Distribution

intel XEON **Build**

intel XEON **Deploy** **Scale**

Statistical AI analysis using AVX-512 and Intel® DL Boost to accelerate the video processing pipeline

Accelerated & encrypted content for distribution using Intel DSA and Intel QAT

AVX = Advanced Vector Extensions, DLBoost = Deep Learning Boost, DSA = Data Streaming Accelerator, QAT = Quick Assist Technology

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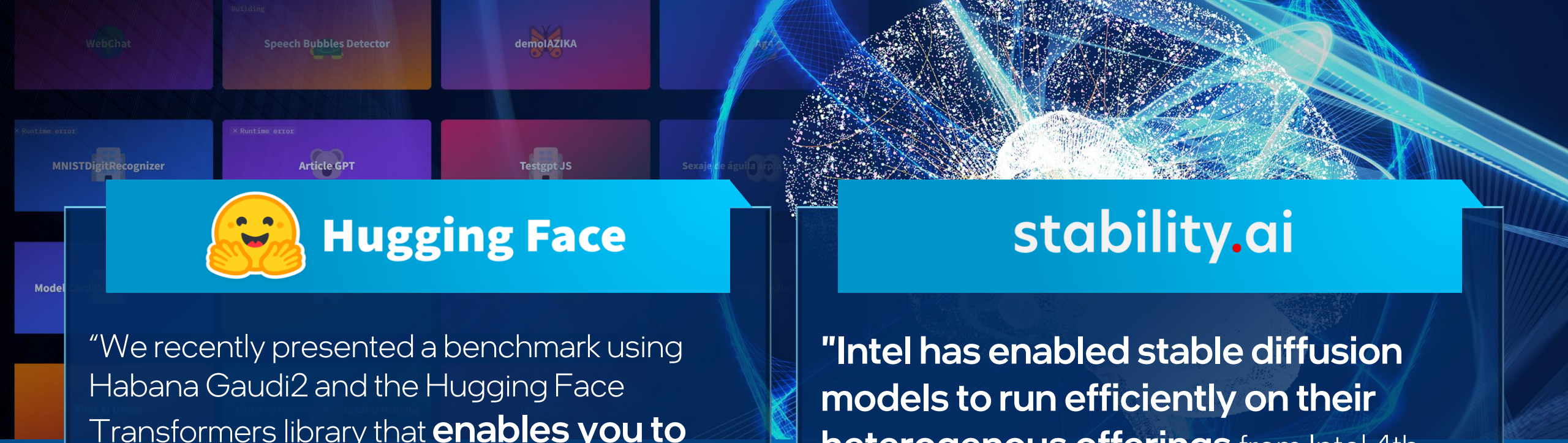

Hugging Face

"We recently presented a benchmark using Habana Gaudi2 and the Hugging Face Transformers library that **enables you to run inference faster than with any GPU currently available on the market.**"

Jeff Boudier
Product Director, Hugging Face

stability.ai

"Intel has enabled stable diffusion models to run efficiently on their heterogenous offerings from Intel 4th Gen Xeon Scalable Sapphire Rapids CPUs to accelerators like Gaudi and hence is a great partner to democratize AI. We look forward to collaborating with them on our next generation language, video and code models and beyond."

Emad Mostaque
Founder and CEO, Stability AI

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Scaling AI Compute

From the cloud, to the network, to the edge

Large-scale data center cluster

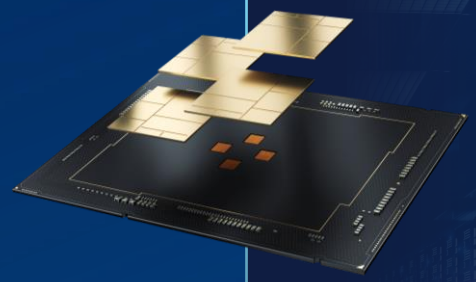
- Hundreds of billions of parameters models
- 256 Xeon processors
- 512 Gaudi deep learning accelerators

System-level approach

- Networking
- Memory bandwidth & capacity
- Software supporting industry frameworks

Portable models with Intel OpenVINO

- Build once, deploy anywhere
- Millions of downloads, hundreds of thousands of developers
- Used across a broad range of verticals



Source: Configuration based on Internal testing on large-scale development cluster with key partners. Results may vary.

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Democratizing AI
with software

Greg Lavender

Senior Vice President, CTO
General Manager, Software and Advanced Technology Group

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Democratizing AI for Everyone

Open

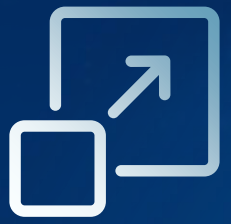
Programmability

Choice

Compatibility

Trust

Inference at the Edge



Scaled

Delivery Mechanism
Infrastructure

Open Accelerated Computing for AI

Hardware / Architecture

Open = Ecosystem Adoption

Open
Programmability

PyTorch

TensorFlow

DeepSpeed

Transformers

SOURCES
https://github.com/pytorch/pytorch/pulse
https://www.intel.com/content/www/us/en/developer/articles/technical/pytorch-2-0-new-performance-features-for-ai.html
https://www.businesswire.com/news/home/20220524005460/en/Intel-oneDNN-AI-Optimizations-Enabled-as-Default-in-TensorFlow

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Open = Programmability

Open
Programmability

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Choice = Open Accelerated Computing

Choice
Compatibility

oneAPI

over 85%
Increase in Install Base ‘21-’22

SOURCE: Internal Intel measurement based on telemetry from our software installers.

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Choice = Open Accelerated Computing

Choice
Compatibility

oneAPI

OpenVINO™

intel AI ANALYTICS TOOLKIT

6.2 million
Intel active developers

64%
of AI/ML developers using Intel tools

SOURCE: Q4 2022 Intel Active Developers Survey, Slashdata, Global 2023. Developer population estimates from sources: IDC, Slashdata, and Evans Data Corporation

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Choice = Compatibility

Choice
Compatibility

SYCLomatic

Nvidia CUDA → Migrate → C++ with SYCL → Build → Deploy

~90%
CUDA Code Migrated Automatically to SYCL

SOURCE: Intel estimates as of September 2021. Based on measurements on a set of 70 HPC benchmarks and samples, with examples like Rodinia, SHOC, PENNANT. Results may vary.

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Trust = Security at the Edge

Trust

Inference at the Edge

Open Federated Learning

(OpenFL)

SOURCE: https://www.intel.com/content/www/us/en/newsroom/news/vision-2022-news-overview.html

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Scale = Intel® Developer Cloud

Scaled

Delivery Mechanism
Infrastructure

cloud.intel.com

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Democratizing AI for Everyone

Open

Programmability

Choice

Compatibility

Trust

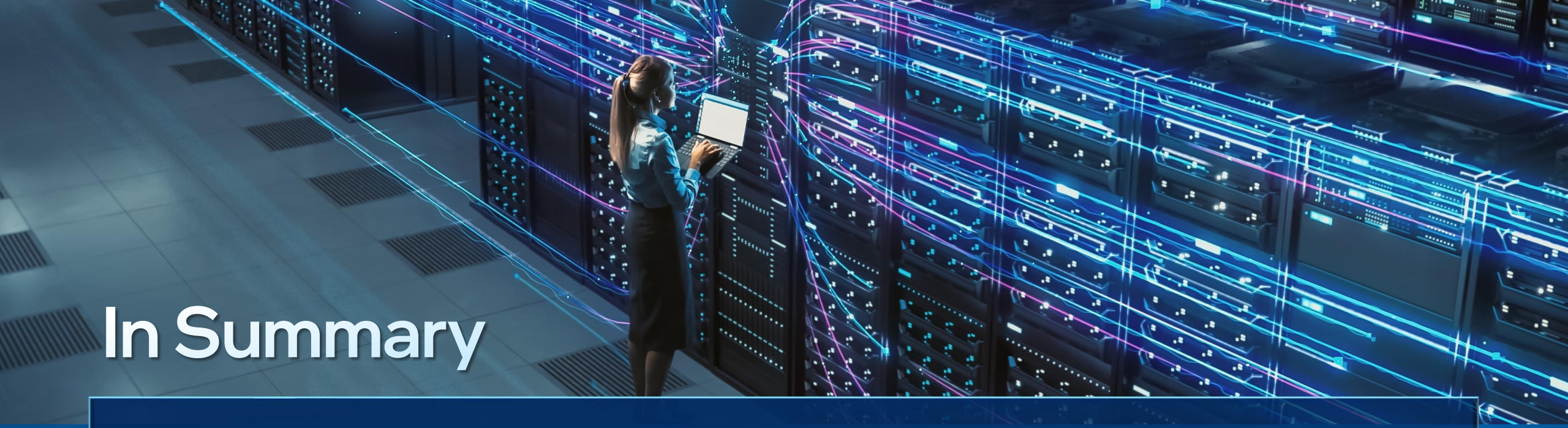
Inference at the Edge

Scaled

Delivery Mechanism
Infrastructure

Open Accelerated Computing for AI

Hardware / Architecture



In Summary

Competing in a **large and growing TAM**

Our roadmap is on track and we're hitting key milestones

Deploying assets to **truly democratize AI**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Performance varies by use, configuration and other factors. Learn more at

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. No product or component can be absolutely secure.

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Altering clock frequency or voltage may void any product warranties and reduce stability, security, performance, and life of the processor and other components. Check with system and component manufacturers for details.

Intel does not control or audit third-party data. You should consult sources to evaluate accuracy.

Performance Disclaimer: Intel Max Series GPUs deliver up to 50% better performance for physics applications versus competitive products.

Configurations:

- Testing as of 1/31/2023 Intel Platform: 1-node 1x Intel® Xeon® 8360Y, HT On, Turbo Enabled, total memory 256GB DDR4-3200, 1x Intel® Data Center GPU Max 1550, Ubuntu 20.04, Kernel 5.15, oneAPI icpx Nightly 20230109
- Testing as of 1/18/2023 Competing Platform: 1-node 1x Intel® Xeon® 8360Y, HT On, Turbo Enabled, total memory 128GB DDR4-3200, 1x PCIe NVIDIA H100, Ubuntu 20.04, Kernel 5.15, GPU Driver 525.60.13, Intel LLVM 20230109, CUDA 12.0
- Workload: Alfvén Wave for grid sizes: 36^3, 48^3, 72^3, 96^3, 132^3, 192^3, 264^3, 390^3, and 516^3 cells. DPEcho GitHub: https://github.com/LRZ-BADW/DPEcho

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