

The background features a complex, glowing blue circuit pattern on a dark blue field. In the top right corner, there is a bright, glowing L-shaped line. The text is centered in the upper half of the image.

# Blueprint Series 12th Gen Intel® Core™ Processors

The Intel logo is located in the bottom left corner. It consists of the word "intel" in white lowercase letters inside a blue square. Below this square is a smaller, solid blue square.

intel®



# Blueprint Series

## Today's Speakers



**Mandy Mock**

Vice President &  
General Manager  
Desktop, Workstation,  
& Channel Group



**Marcus Kennedy**

General Manager  
Gaming, Creator &  
Esports Segment



**Guy Therien**

Intel Fellow



**Ivan Goldwasser**

Senior Director,  
Performance Marketing



**Dan Ragland**

Principal Engineer,  
Overclocking





# Introducing 12th Gen Intel® Core™

Mandy Mock

Vice President and General Manager  
Desktop, Workstation, and Channel Group

intel®



A woman with brown hair in a ponytail is seen from the side, wearing a large black headset with a microphone. She is sitting at a desk, looking at a computer monitor. Her hands are on a backlit keyboard. The background is dark and out of focus. Overlaid on the entire image is a blue circuit board pattern with glowing nodes.

Creating world-changing  
technology to improve the  
life of every person on Earth



# Introducing Unlocked 12th Gen Intel Core Desktop Processors



**World's Best  
Gaming Processor**

**Best Overclocking  
Experience**

**Giant Leap for  
Content Creation**

As measured by unique features and superior in-game benchmark mode performance (score or frames per second) on majority of the 31 game titles tested (as of Oct 1, 2021), including in comparison to AMD Ryzen 5950X. Based on enhanced overclocking ability enabled by Intel's comprehensive tools and unique architectural tuning capabilities. Overclocking may void warranty or affect system health. Learn more at [intel.com/overclocking](https://www.intel.com/overclocking). For workloads & configurations visit [www.intel.com/PerformanceIndex](https://www.intel.com/PerformanceIndex). Results may vary.



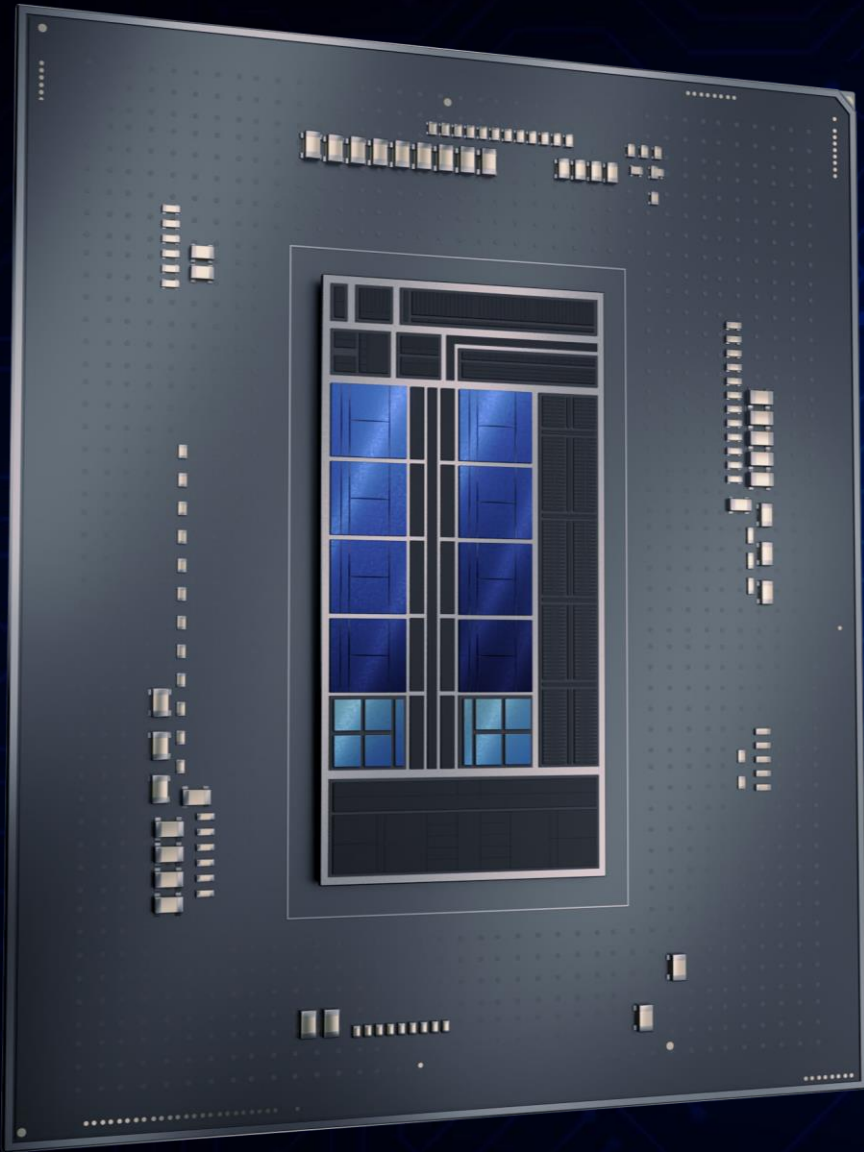
# Reinventing Multi-Core Architecture

Single, Scalable SoC Architecture on Intel 7 process

Performance hybrid architecture & Intel® Thread Director

19% performance lift with new Performance-core

New Efficient-cores add massive MT performance

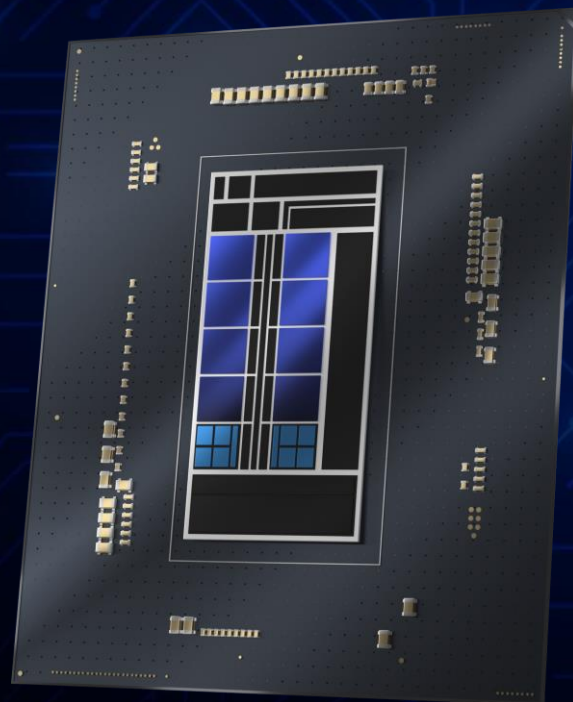




# Scalable Client Architecture

## Desktop

LGA 1700  
Socket



## Mobile

BGA Type3  
50 x 25 x 1.3 mm



## Ultra Mobile

BGA Type4 HDI  
28.5 x 19 x 1.1 mm





# Broad Ecosystem Support & Readiness

Incredible partnerships for  
product readiness at launch

**140+** customers

**30+** countries

**60+** motherboards

 Microsoft

ALIENWARE™



acer

msi™



Lenovo

amazon

GIGABYTE™

DIGITALSTORM

ASRock

ORIGIN

THIRDWAVE

ASUS®

BEST  
BUY.



CYBERPOWERPC



MAINGEAR

SCAN<sup>s</sup>



newegg®

Compuzone



iBUYPOWER





# 12th Gen Intel Core Desktop Platform Overview

Marcus Kennedy  
General Manager

Gaming, Creator, and Esports Segment

intel®



# 12th Gen Intel® Core™ Desktop Processors



**World's Best  
Gaming Processor**

**Best Overclocking  
Experience**

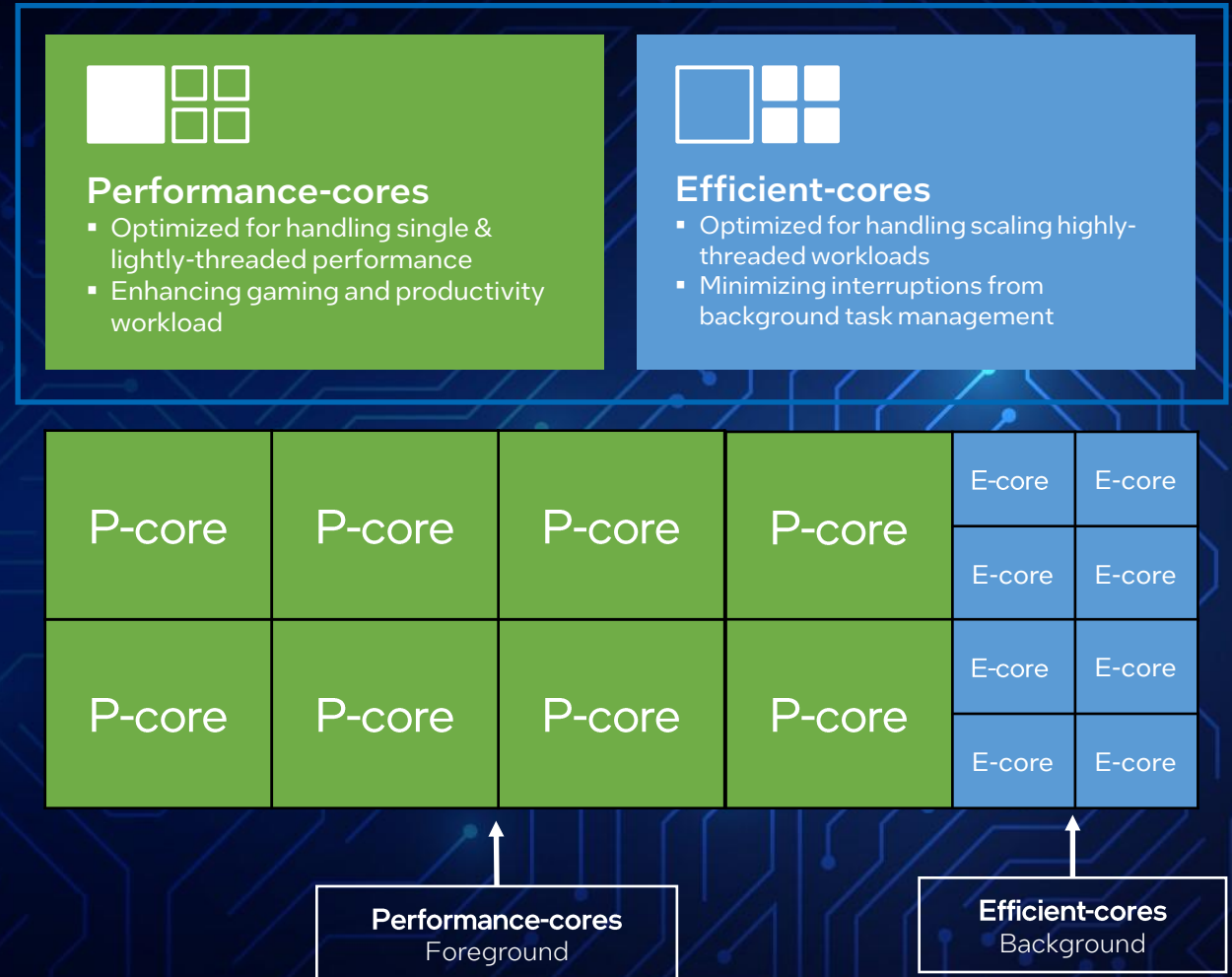
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# Intel's Biggest Architectural Shift in a Decade

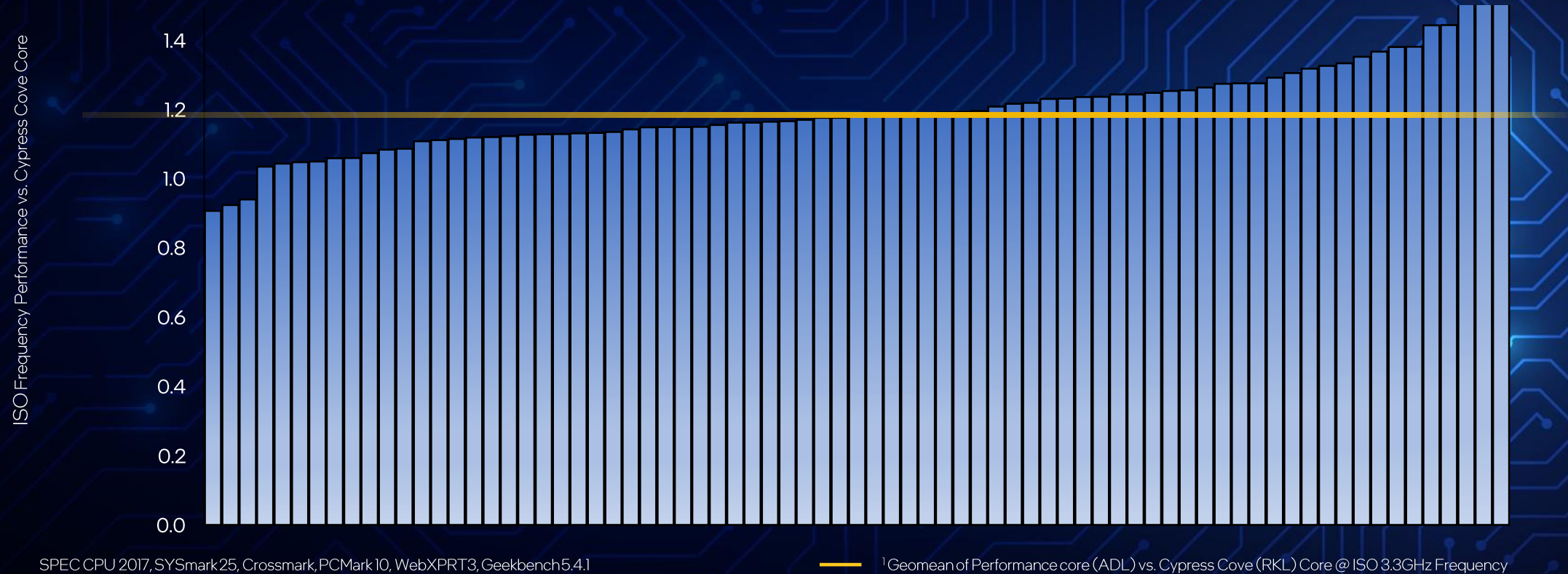
- Performance hybrid architecture combines two new core microarchitectures on a single processor die
- P-core and E-core deliver improvements for single-threaded and multi-threaded workloads
- Available on all unlocked 12th Gen Intel Core desktop processors





# 19%

## Performance Improvement at ISO Frequency<sup>1</sup>





# Intel® Thread Director

Intelligence built directly into the core

Monitors the runtime instruction mix of each thread with nanosecond precision

Provides runtime feedback to the OS to make the optimal scheduling decision for any workload or workflow

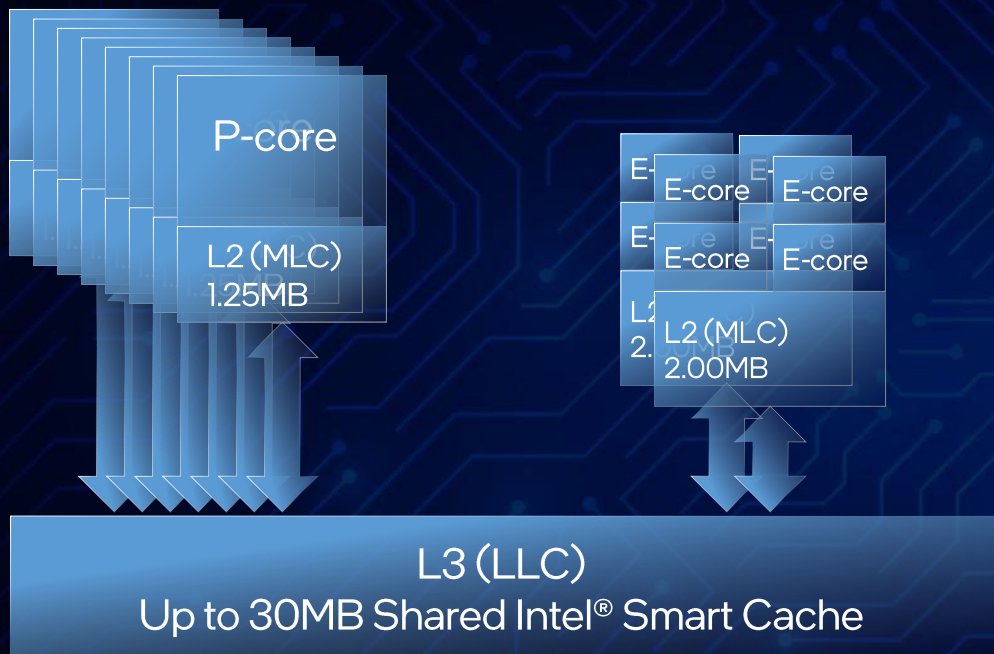
Dynamically adapts guidance based on the thermal design point, operating conditions, and power settings – without any user input



**Intel Thread Director helps optimize performance hybrid architecture with Windows 11**



# 12th Gen Intel® Core™ Cache Architecture



## NEW Cache Architecture

- Common Intel® Smart Cache shared among P-cores, E-cores and processor graphics
- Increased L2 Cache per P-Core
- L2 Cache shared amongst each E-Core cluster

**Delivering large memory capacity and reduced latency  
for fast game loading and smooth frame rates**



# What's New in Unlocked 12th Gen Intel Core Desktop Processors

## Architecture Improvements

- NEW** Intel 7 process technology
- NEW** Performance hybrid architecture, combining P-cores and E-cores
- NEW** Intel® Thread Director
- NEW** Core architecture featuring performance improvements
- NEW** Up to 16 cores (8 P-cores + 8 E-cores) and 24 threads
- NEW** Increased L2 cache and L3 shared Intel® Smart Cache

## Platform Improvements

- NEW** DDR5 support (up to 4800MT/s)<sup>3</sup>
- NEW** Processor PCIe 5.0 (up to 16 lanes)<sup>4</sup>
- NEW** Chipset PCIe 4.0 (up to 12 lanes)
- NEW** Integrated Intel® Wi-Fi 6E support
- NEW** Up to 8 DMI 4.0 lanes
- ENHANCED** Core and memory overclocking<sup>4</sup>
- ENHANCED** Intel® UHD graphics driven by Xe Architecture<sup>‡</sup>

## Featured Tech

- DDR4 support (up to 3200MT/s)
- PCIe 4.0 (up to 4 lanes)
- Intel® Deep Learning Boost
- Intel® Gaussian & Neural Accelerator 3.0 (GNA)
- Discrete Thunderbolt™ 4 technology support (USB4 compliant)<sup>±</sup>
- Intel® Optane™ memory support<sup>‡,5</sup>
- Intel® Killer™ Wi-Fi 6/6E

<sup>‡</sup> Available only on 12th Gen Intel® Core™ processors featuring integrated graphics.

<sup>±</sup> Discrete Thunderbolt™ 4 technology is only validated and supported from Intel® 600 Series Chipset PCIe lanes.

<sup>‡</sup> Intel Hybrid Storage devices cannot attach to CPU PCIe due to PCIe 2x2 requirement. Guidance is to connect to the PCH PCIe lanes to get the PCIe 2x3 support.

For workloads & configurations visit [www.Intel.com/PerformanceIndex](http://www.Intel.com/PerformanceIndex). Results may vary.



# First in Platform Innovation

## PCIe 5.0

Leadership in I/O transitions

**16 lanes of PCIe 5.0  
from the CPU**

Driving PCIe  
5.0<sup>4</sup> ready  
designs

Driving dGfx &  
Storage  
upgrades

Enabling 2x  
I/O  
throughput

## DDR5

Innovation in Memory Capabilities

**Up to DDR5-4800 MT/s  
Up to DDR4-3200 MT/s**

Leading the  
Industry  
Transition

Faster Speeds  
& Higher  
Bandwidth

Enhanced  
Workflow  
Productivity

For workloads & configurations visit [www.intel.com/performance/index](https://www.intel.com/performance/index). Results may vary.

See notices and disclaimers slide for details.



# Introducing the Intel® 600 Series Chipset

## New Platform Capabilities

**NEW** Chipset PCIe 4.0 lanes

**NEW** x8 DMI Gen 4.0 for double and faster bandwidth between chipset and processor

**NEW** Integrated Intel® Wi-Fi 6E (Gig+)

**NEW** Intel® Volume Management Device (Intel® VMD) for user friendly PCIe device management

**Additional** USB 3.2 Gen 2x2 20Gbps for double the USB connectivity speed<sup>P</sup>

Integrated Intel® Wi-Fi 6E (Gig+)	DMI Gen 4.0 – 8x Lanes		Intel® High-Definition Audio
Intel® 2.5G Base-T MAC/PHY Ethernet	Intel® Extreme Tunning Utility Support	Intel® Management Engine Firmware	Intel® Smart Sound Technology
Intel® Integrated 10/100/1000 MAC			Intel® Rapid Storage Technology for SATA & PCIe Storage
USB I/O	Intel® Platform Trust Technology		Intel® Rapid Storage Technology with RAID
Up to 4 x USB 3.2 Gen 2x2 Ports			Intel® Optane Memory with Solid State Storage Support
Up to 10 x USB 3.2 Gen 2x1 Ports			
Up to 10 x USB 3.2 Gen 1x1 Ports			
14 x USB 2.0 Ports			
PCIe Gen 4.0 – up to 12x Lanes + PCIe Gen 3.0 – up to 16x Lanes			SATA 6Gb/s – 8x Lanes
INTEL® Z690 CHIPSET			

<sup>P</sup> USB 3.2 Gen 2x2 compared to USB 3.2 Gen 2x1 10Gbps.

<sup>Q</sup> CPU PCIe lanes are only validated for discrete graphics (x16) and PCIe storage.

<sup>R</sup> Intel Hybrid Storage devices such as Pyramid Glacier (H20) can't attach to CPU PCIe due to PCIe 2x2 requirement. For workloads & configurations visit [www.Intel.com/PerformanceIndex](http://www.Intel.com/PerformanceIndex). Results may vary.





# World's Best Gaming Processor

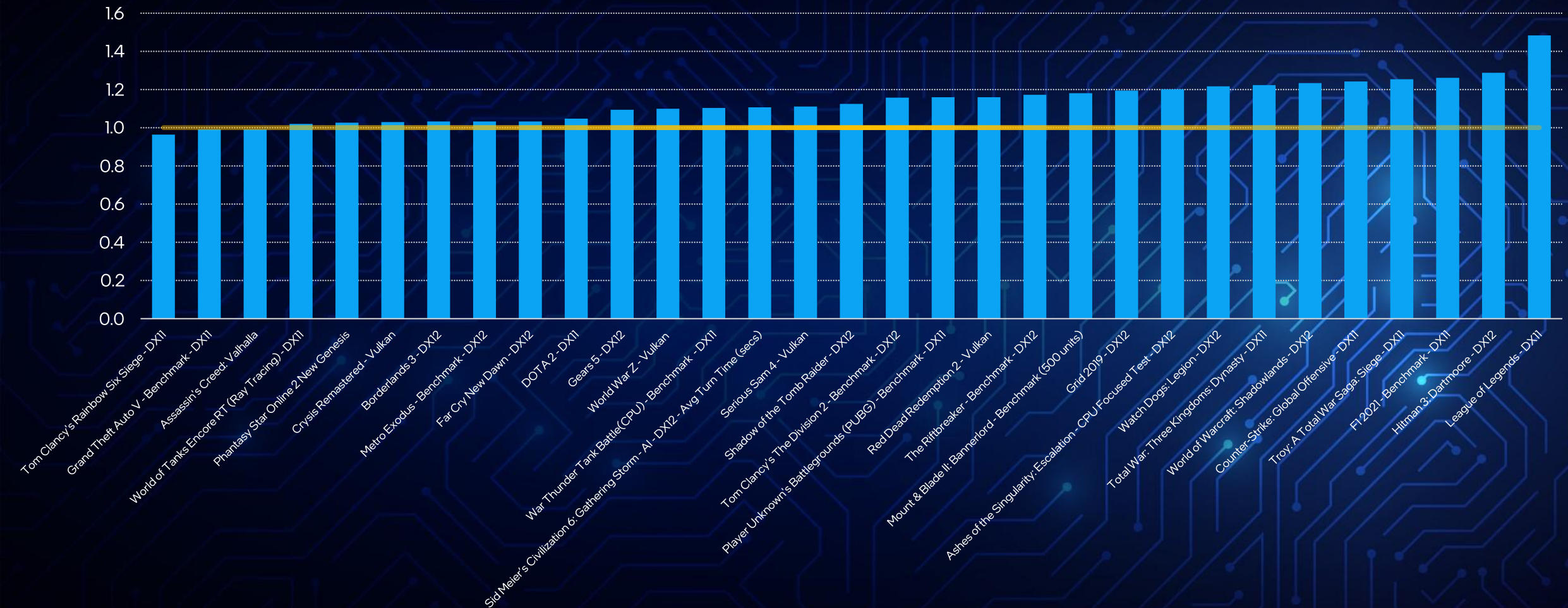
## Giant Leap for Creation

As measured by unique features and superior in-game benchmark mode performance (score or frames per second) on majority of the 31 game titles tested (as of Oct 1, 2021), including in comparison to AMD Ryzen 5950X. For workloads & configurations visit [www.Intel.com/PerformanceIndex](http://www.Intel.com/PerformanceIndex). Results may vary.



# Leap in Gaming Performance

## Intel Core i9-12900K vs Intel Core i9-11900K

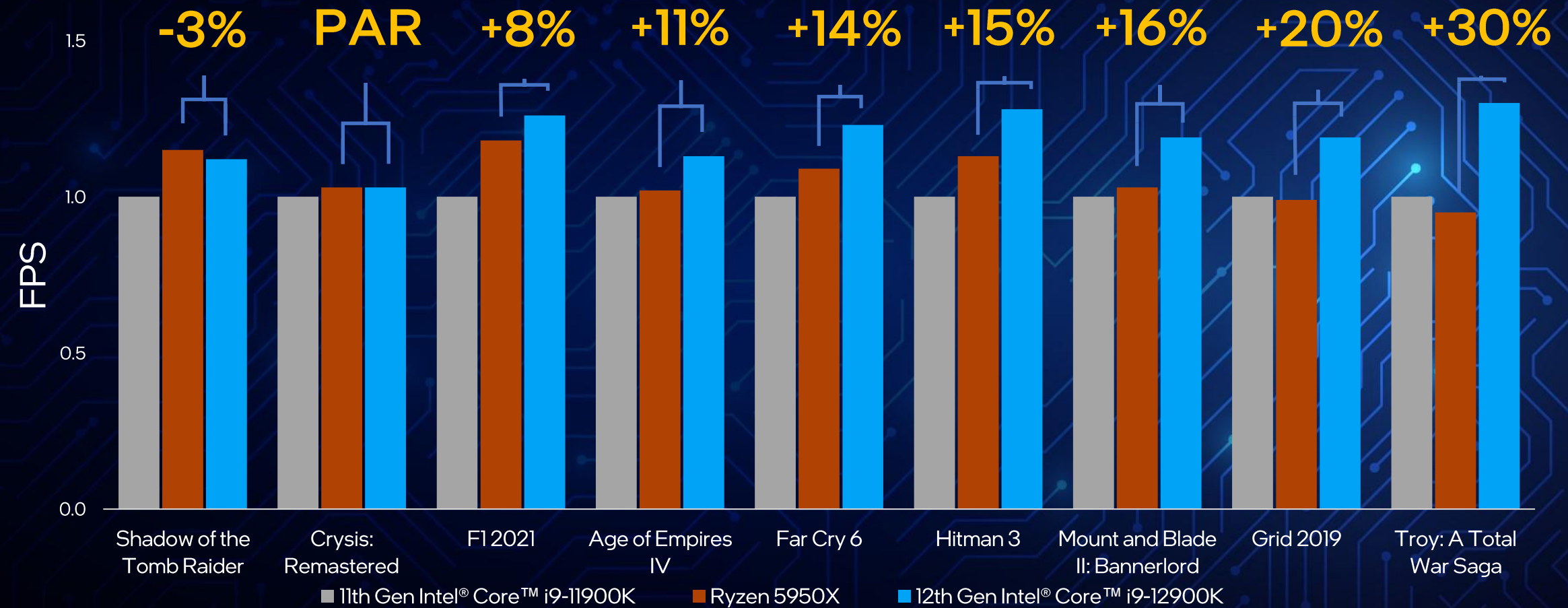


**World's best gaming processor delivers massive gen-on-gen performance gains**

As measured by unique features and superior in-game benchmark mode performance of 12th Gen Intel Core i9-12900K with Z690 and DDR5 4400MHz DRAM vs 11th Gen Intel Core i9-11900K with Z590 and DDR4 3200MHz DRAM. Configurations for both systems include Windows 11 Pro, 1920x1080 Resolution – High Quality Graphics Preset with EVGA RTX 3090 GPU. For workloads & configurations visit [www.Intel.com/PerformanceIndex](http://www.Intel.com/PerformanceIndex). Results may vary.



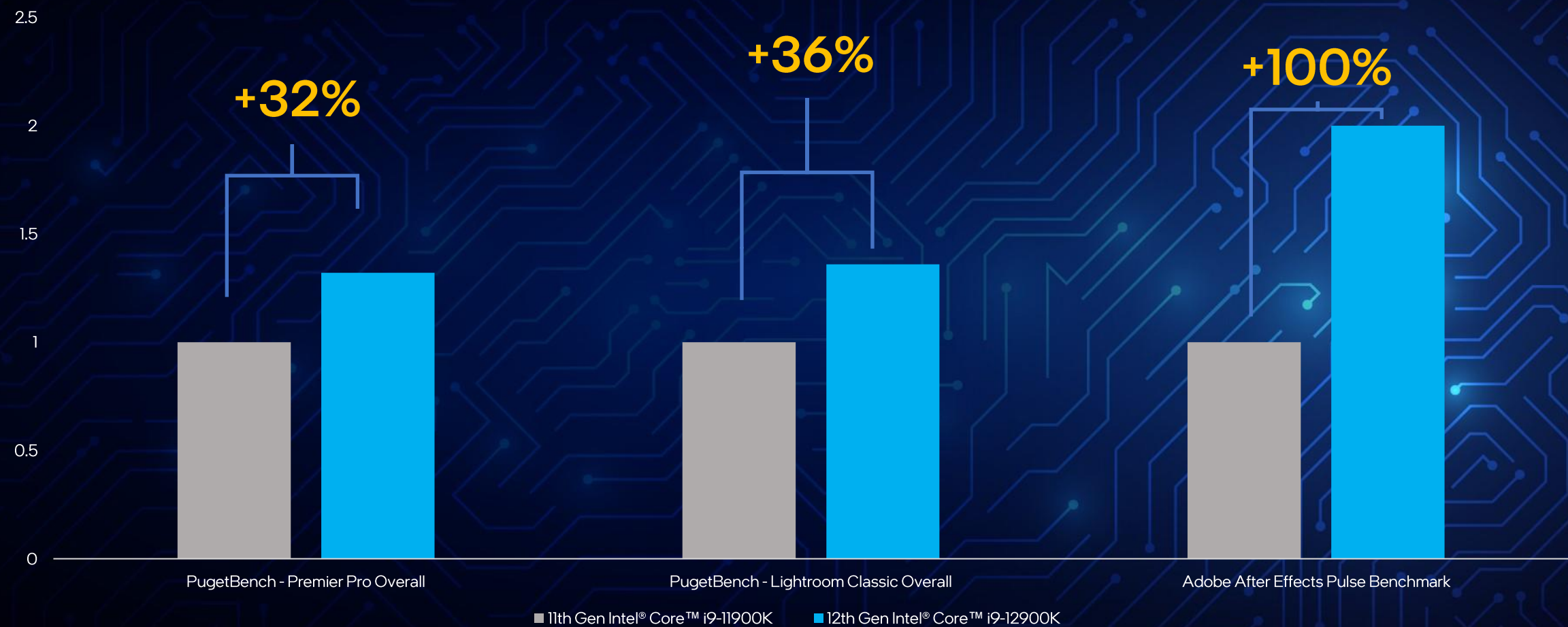
# Leadership Gaming Performance



As measured by unique features and superior in-game benchmark mode performance of 12th Gen Intel Core i9-12900K with Z690 and 64GB DDR5 4400MHz DRAM against (1) 11th Gen Intel Core i9-11900K with Z590 and 64GB DDR4 3200MHz DRAM and (2) AMD Ryzen 5950X with X570 and 64GB DDR4 3200MHz DRAM. Configurations for all systems include Windows 11 Pro, 1920x1080 Resolution – High Quality Graphics Preset with EVGA RTX 3090 GPU. For workloads & configurations visit [www.Intel.com/PerformanceIndex](http://www.Intel.com/PerformanceIndex). Results may vary. Other names and brands may be claimed as the property of others.



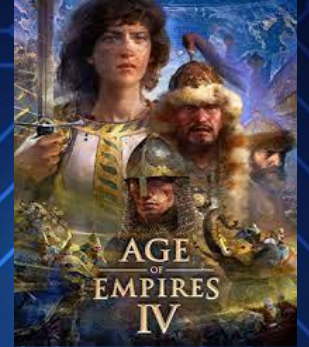
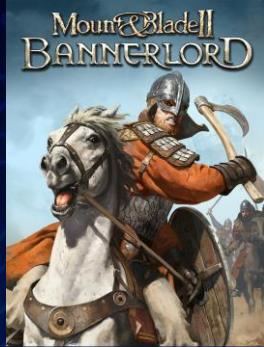
# Giant Leap for Content Creation



For workloads & configurations visit [www.Intel.com/PerformanceIndex](http://www.Intel.com/PerformanceIndex). Results may vary.



# Content is King: Enabling the Ecosystem



Ae

Adobe After Effects



REVIT<sup>®</sup>



LUMINAR<sup>AI</sup>

Pr

Adobe Premiere Pro



AUTODESK<sup>®</sup>  
MAYA<sup>®</sup>



LrC

Adobe Photoshop Lightroom Classic



AUTODESK<sup>®</sup>  
ARNOLD



VEGAS Pro





# Software Enabling, 12th Gen Intel Core Performance, Hybrid and Power Definitions

Guy Therien  
Intel Fellow

intel®



# Software Ecosystem Enablement for Hybrid Platforms



OS co-engineering and enablement to deliver consistent and optimized performance



Application development white papers

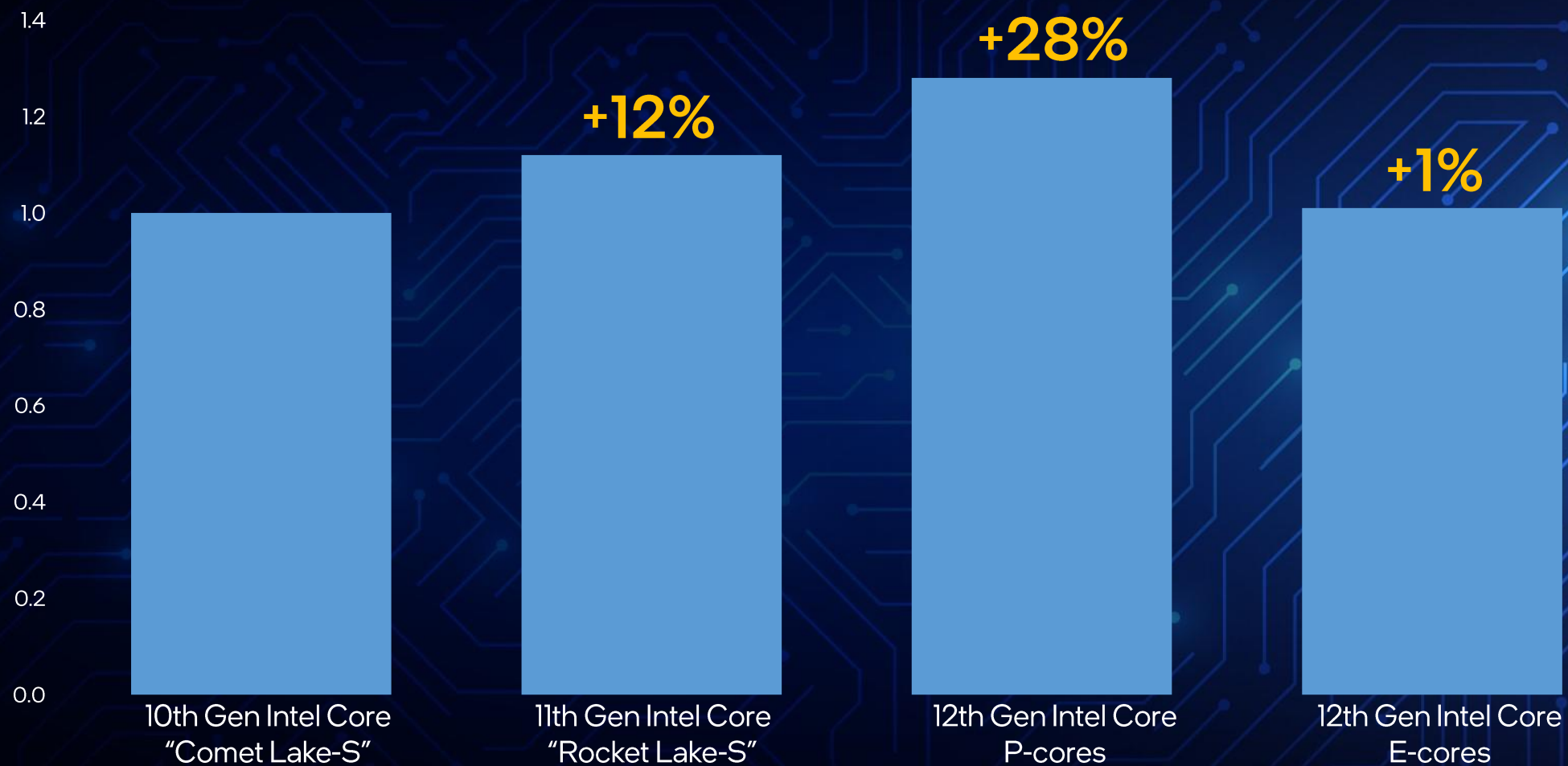


Extensive testing performed in search of any potential software incompatibilities with hybrid

**Developers can join us to learn more about developing for Windows 11 and our performance hybrid architecture at Intel Innovation**



# Single-Threaded Fixed-Frequency Performance



Source: Intel Corporation; historical data; estimated SPECrate2017\_int\_base – 1 copy ICC 2021.2, measured on Intel internal reference platforms in time frame of product launch  
For workloads & configurations visit [www.intel.com/PerformanceIndex](https://www.intel.com/PerformanceIndex). Results may vary.

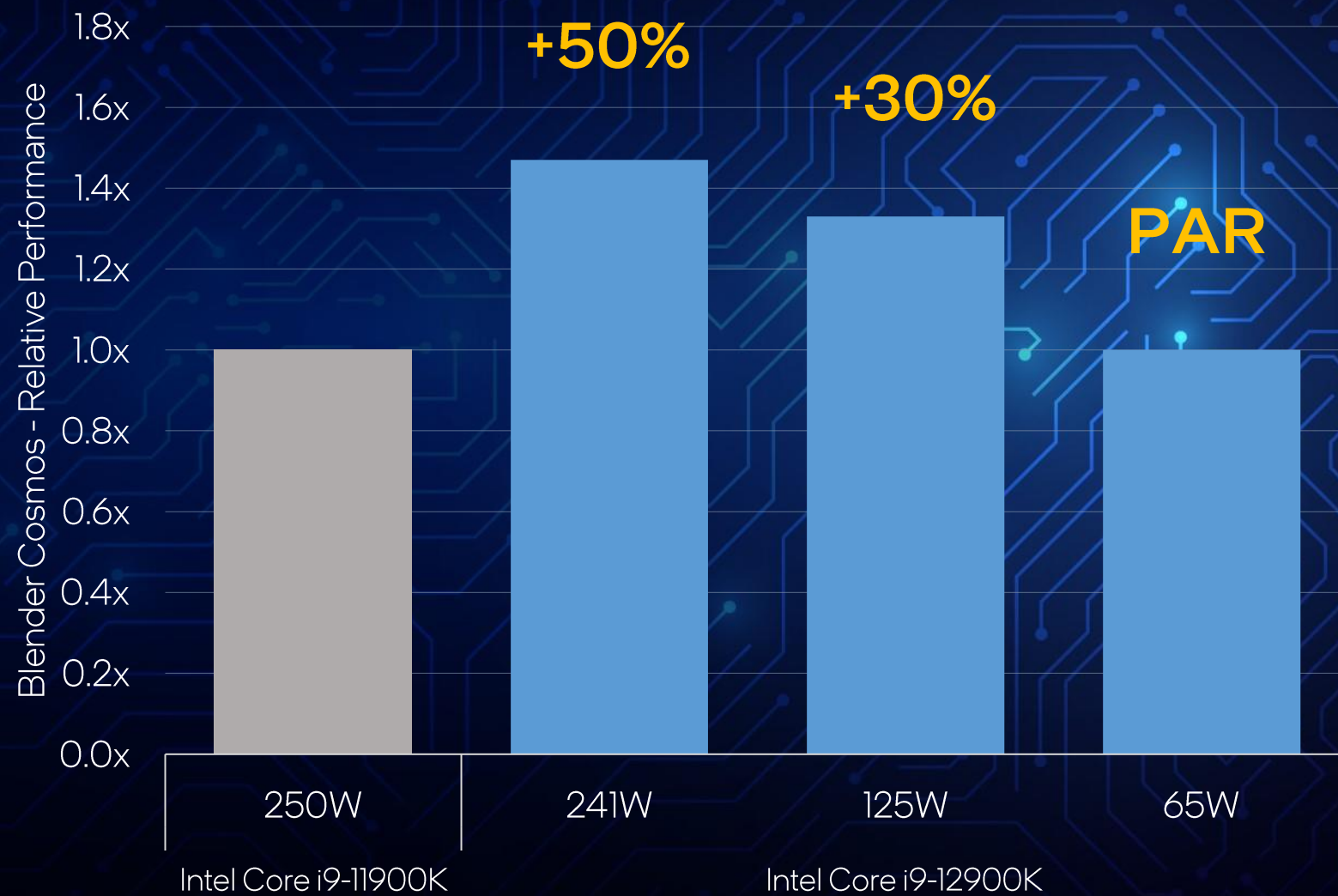


# Why Performance Hybrid?

Intel Core i9-12900K scaling vs. Intel Core i9-11900K

**50% higher MT  
performance  
at peak power**

**Similar MT  
performance at  
approx. ¼ power**

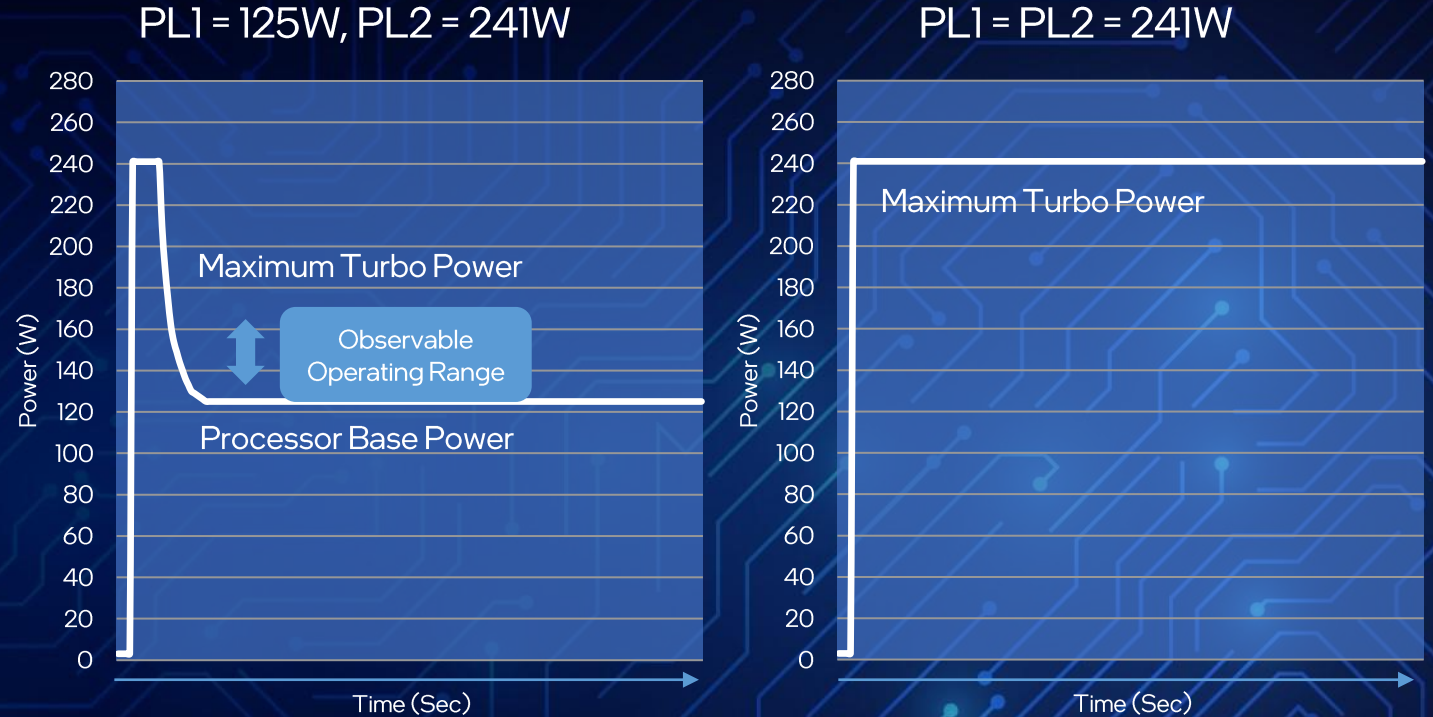




# Power Definition Updates

## 12th Gen Intel Core

- Processor Base Power
- Maximum Turbo Power
- Default power controls



Turbo time-in-state illustration of PL1 = 125W (Processor Base Power) versus PL1 = PL2 = 241W (Maximum Turbo Power)

**Evaluating unlocked 12th Gen desktop processors in their default configuration will assess the best maximum performance capability**





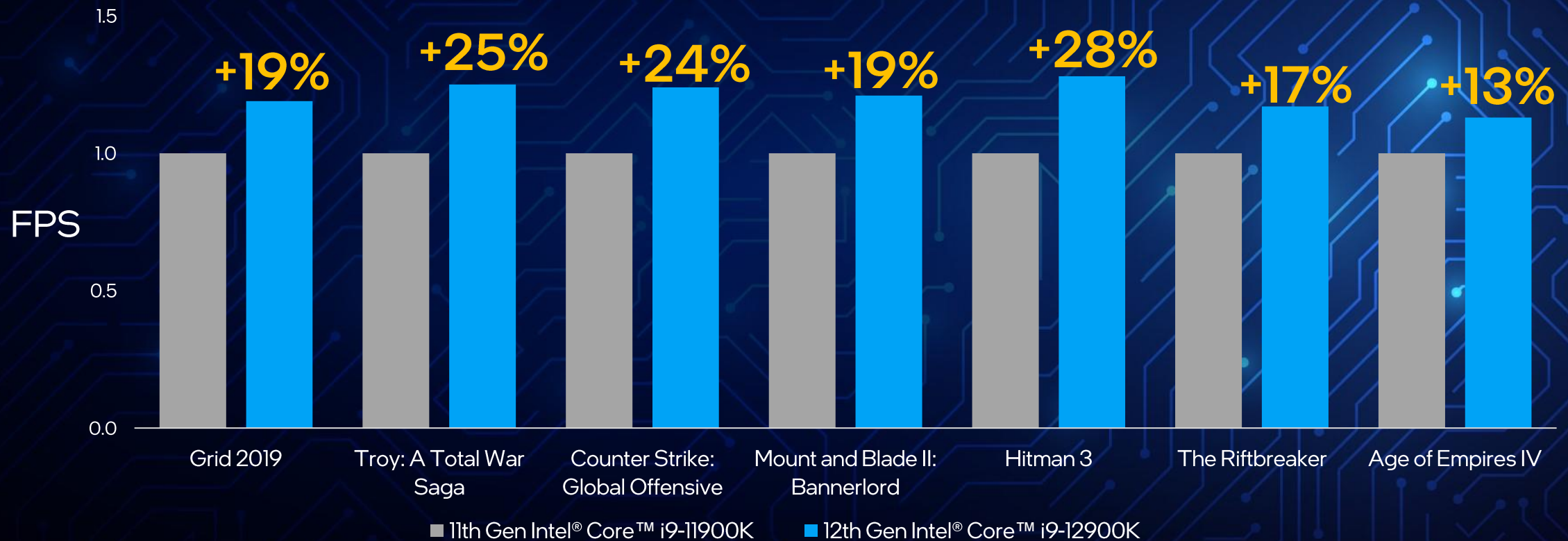
# Measuring 12th Gen Intel Core Performance

Ivan Goldwasser  
Senior Director  
Performance Marketing

intel®











# Leap in Gaming Performance: How We Test It

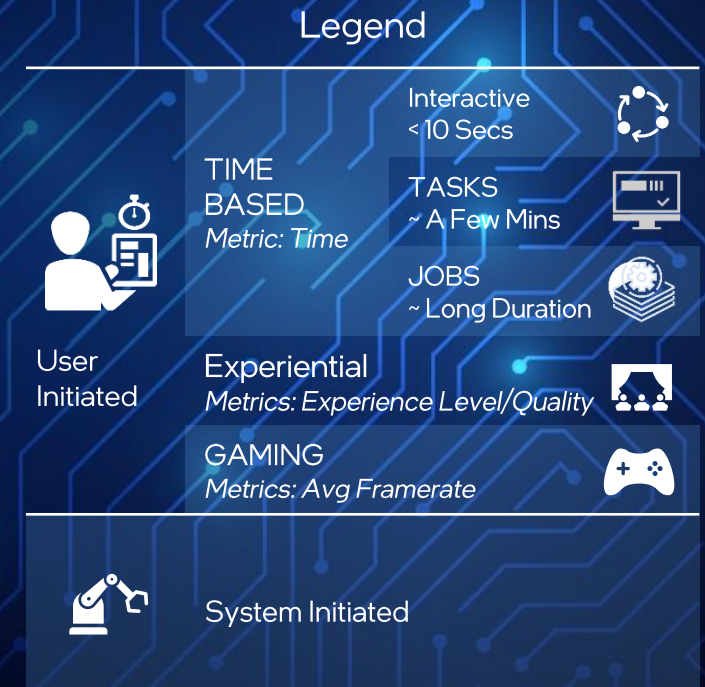


As measured by unique features and superior in-game benchmark mode performance of 12th Gen Intel Core i9-12900K with Z690 and DDR5 4400MHz DRAM vs 11th Gen Intel Core i9-11900K with Z590 and DDR4 3200MHz DRAM. Configuration for both systems include Windows 11 Pro, 1920x1080 Resolution – High Quality Graphics Preset with EVGA RTX 3090 GPU. For workloads & configurations visit [www.intel.com/performance/index](https://www.intel.com/performance/index). Results may vary.



# Measuring Performance Hybrid

	BACKGROUND TYPE	WORKLOAD & METRIC EXAMPLES
I	 <b>USER INITIATED SHORT ACTIVITIES</b> Examples: Editing a photo, compressing a folder  	Editing photos while transcoding a video  Geomean of foreground and background activities.
II	<b>USER INITIATED LONG ACTIVITIES</b> Examples: Transcoding a video library, Watching a video, streaming + recording gameplay   	Gaming while streaming and recording the session  Foreground metric and background experience level / quality
III	<b>SYSTEM INITIATED PROCESSES</b> Examples: IT environment with encryption, virus scans  	Creating a presentation, email on an IT configured system  Foreground metric and qualified system overhead





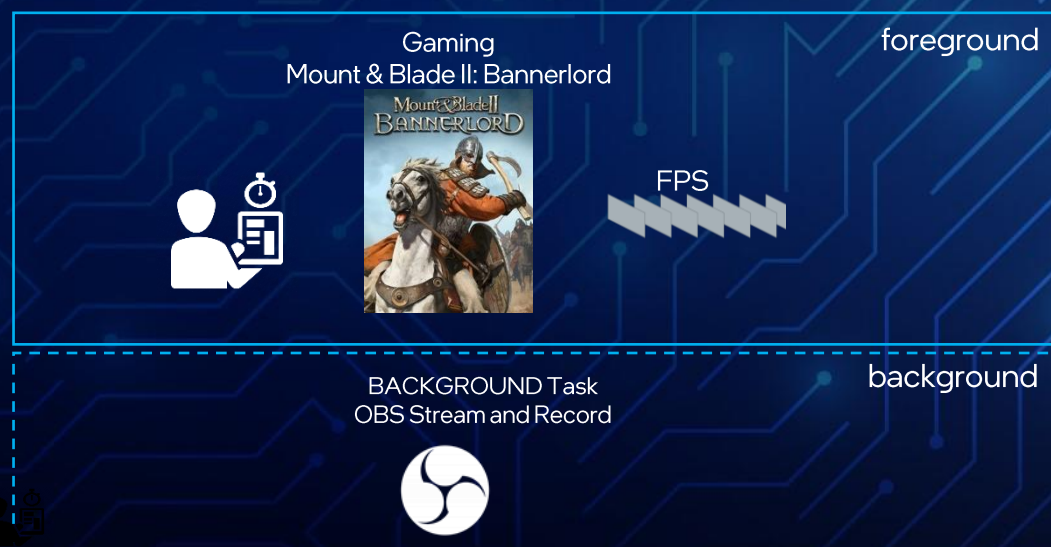
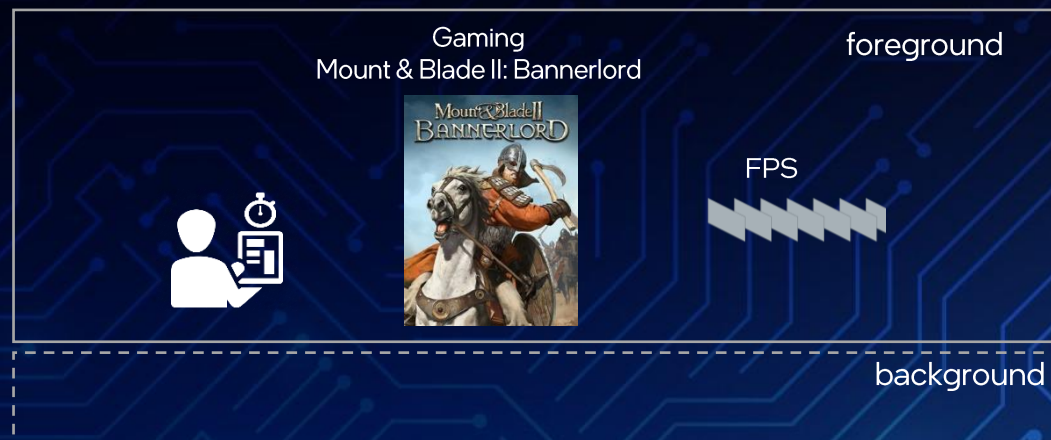
# Gaming Workflow

Intel Core i9-12900K vs  
Intel Core i9-11900K

Gaming and Streaming



When run concurrently



**Effective usage of P- and E-cores for Game, Stream and Record**



# Creator Multi-tasking Workflow: Adobe Lightroom Classic + Adobe Premiere Pro



**Effective usage of P-cores and E-cores resulting in 47% faster task completion  
on Intel Core i9-12900K versus Intel Core i9-11900K**

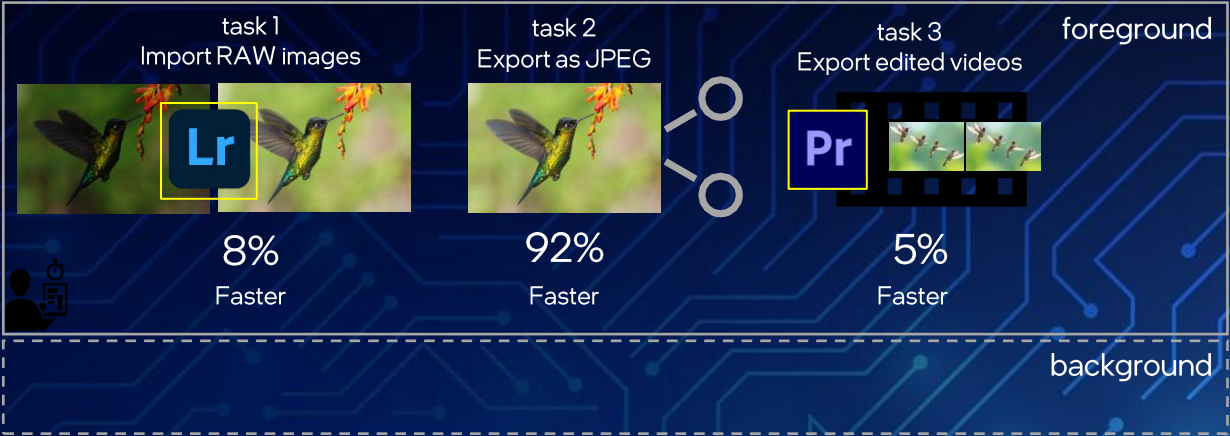
For workloads & configurations visit [www.intel.com/performance/index](https://www.intel.com/performance/index). Results may vary.



# Content Creation Workflow

Intel Core i9-12900K vs  
Intel Core i9-11900K

If run serially



When run concurrently





# New Representative and Real-World Benchmarks

**UL Procyon™**  
Professional Benchmark Suite



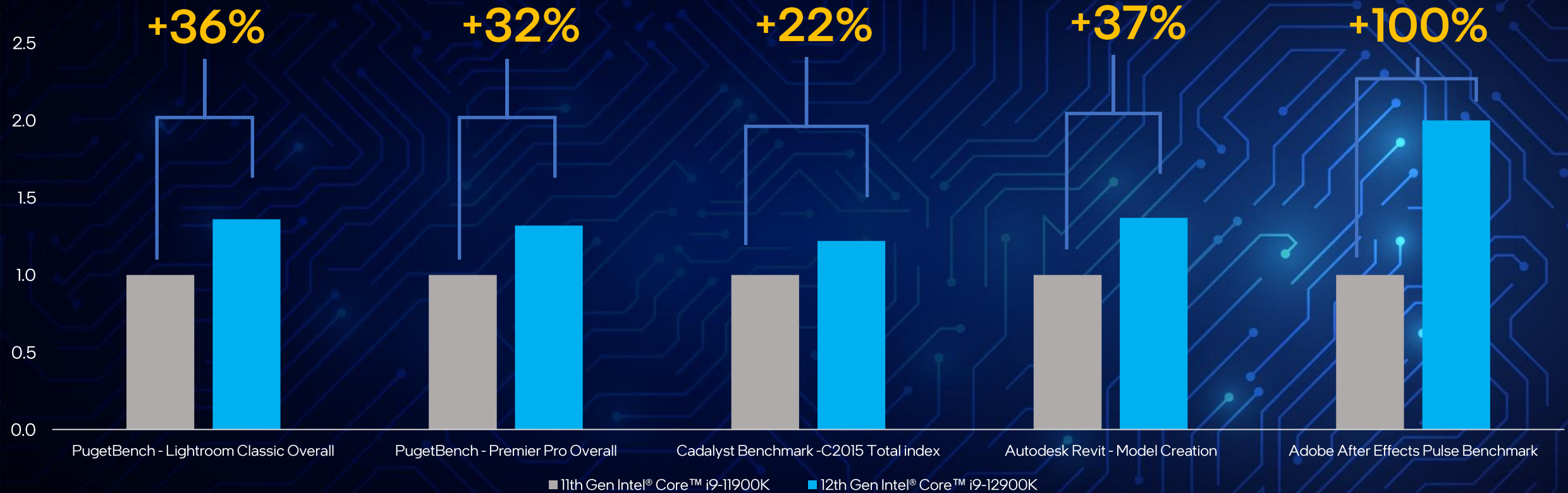
- UL Procyon Office Productivity Measure PC performance with Microsoft Office apps.
- Replaces performance tests in PCMark 10 and PCMark 10 Applications
- Models real-world applications
- Cross-platform
- Easy to use
- Differentiates products by system performance and system responsiveness
- Available on Windows Store, iTunes and Mac App Store
- RFO Benchmark – Revit Forum
- Cadalyst Systems Benchmark for AutoCAD
- Puget Bench – Content creation workflows including Adobe products

**The industry is transitioning to the use of real-world performance measurements**



# Giant Leap in Performance for Content Creation Workloads

## Intel Core i9-12900K vs Intel Core i9-11900K



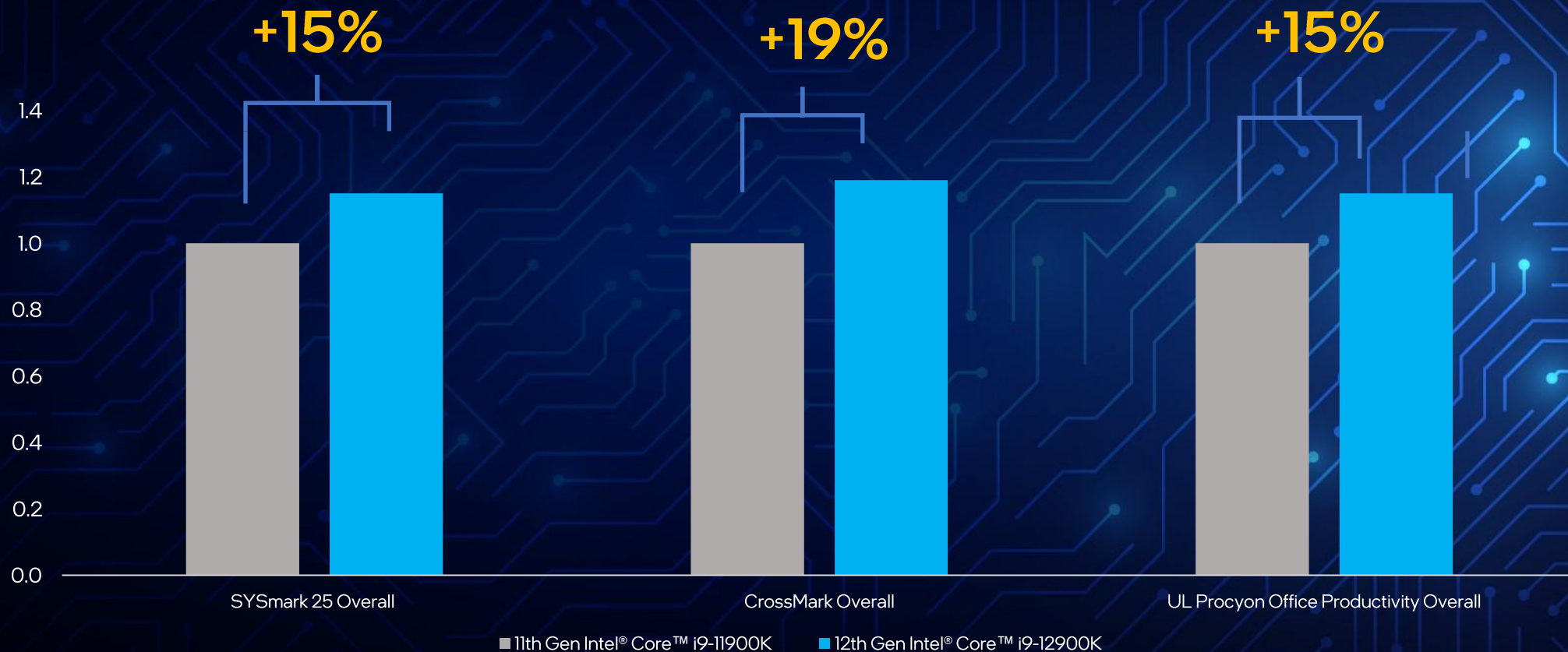
**Leadership across photo editing, video editing, 2D modeling, 3D modeling and multi-frame rendering**

For workloads & configurations visit [www.Intel.com/PerformanceIndex](http://www.Intel.com/PerformanceIndex). Results may vary.



# Productivity Performance

## Intel Core i9-12900K vs Intel Core i9-11900K



**A leap in productivity performance**

For workloads & configurations visit [www.intel.com/performance/index](https://www.intel.com/performance/index). Results may vary.



# Measuring 12th Gen Intel Core Performance



Leap in Gaming Performance

Performance Hybrid for Multi-Tasking

Real-World Workloads





# Overclocking

Dan Ragland  
Principal Engineer



intel®

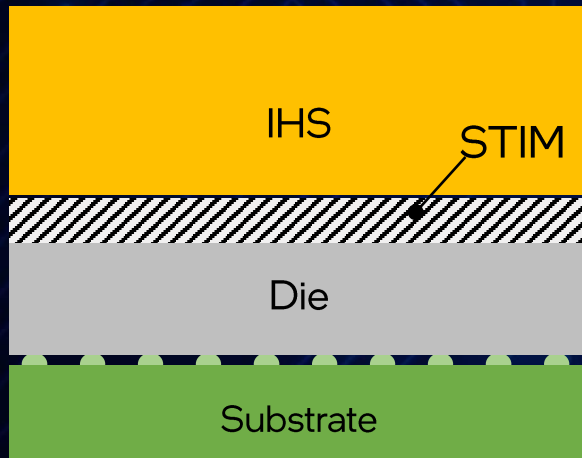
The Intel logo is displayed in white lowercase letters on a blue square background. A smaller, solid blue square is positioned directly below the main blue square.



# Thermal Improvements Through Package Optimization

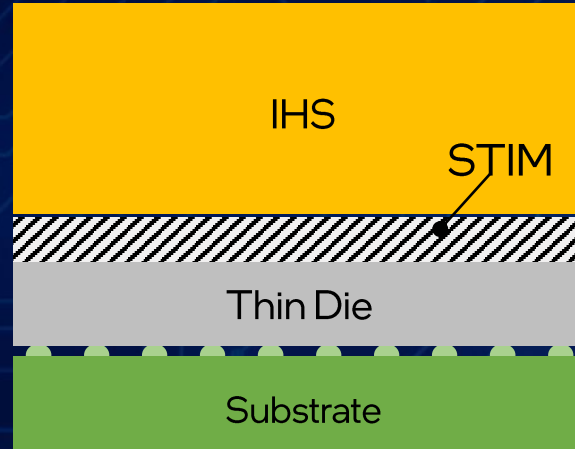
9th Gen Intel Core

STIM



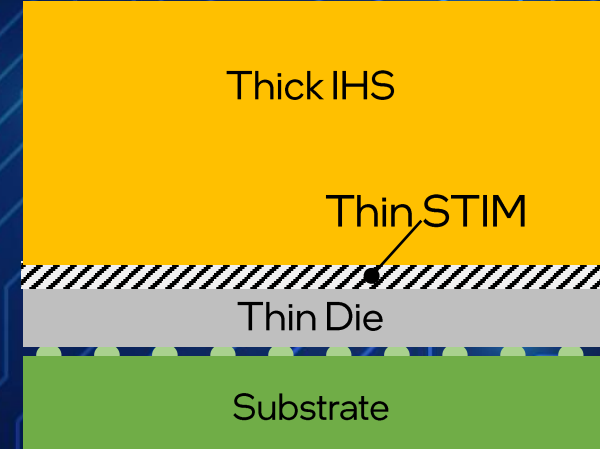
10th and 11th Gen Intel Core

Thin Die STIM



12th Gen Intel Core

Thin Die + Thin STIM



Thin Die + Thin Solder Thermal Interface Material



# New Overclocking Opportunities with 12th Gen Intel® Core™

## Processor Core Overclocking

**NEW** Efficient Core overclocking

## Memory Overclocking

**NEW** DDR5 Overclocking, in addition to DDR4

**NEW** Intel® XMP 3.0 support for DDR5

**NEW** Intel® Dynamic Memory Boost feature

## Others

**NEW** Synthetic Internal BCLK control option

Enhanced Intel® Extreme Tuning Utility rev 7.5 software

**Continued innovation to deliver more capabilities to enthusiast overclockers!**





# Overclocking Fully Unlocked on “K” SKUs and Z690 Chipset



Intel Core i9-12900K & Intel Core i9-12900KF

Intel Core i7-12700K & Intel Core i7-12700KF

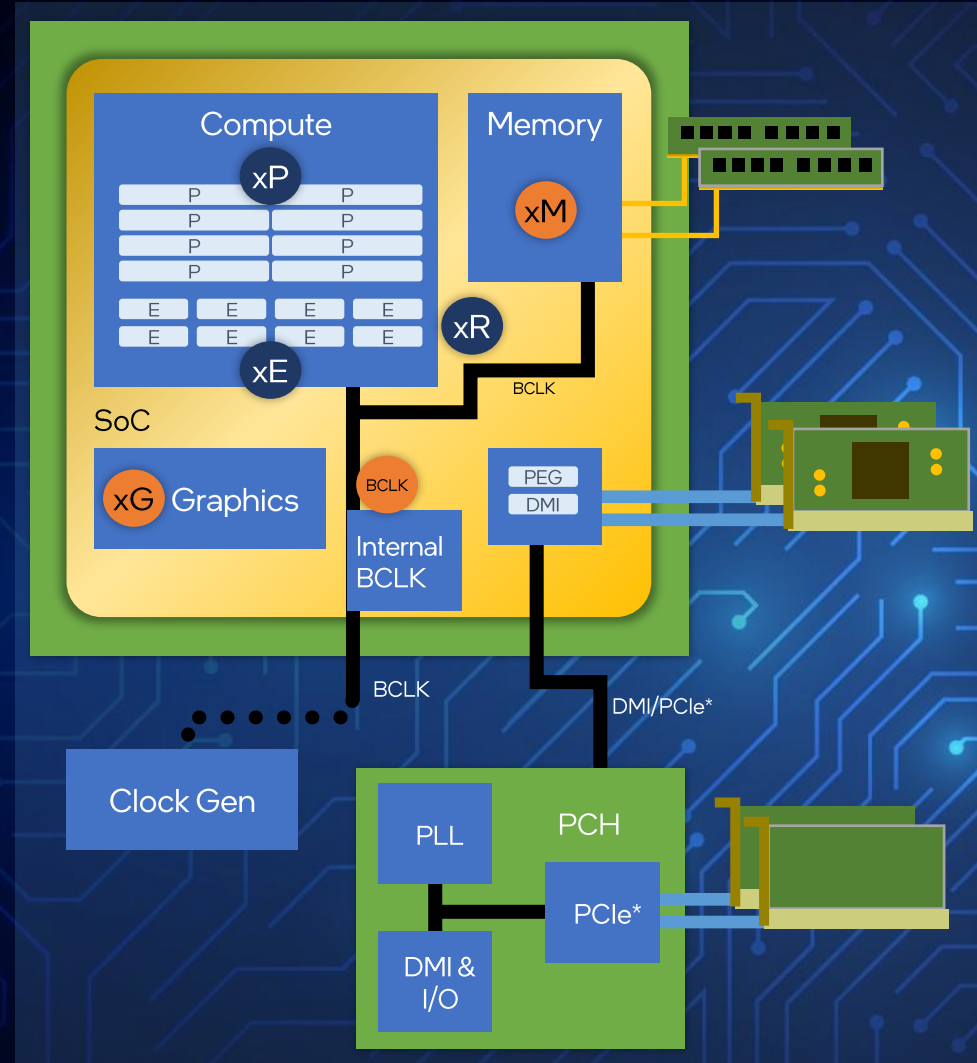
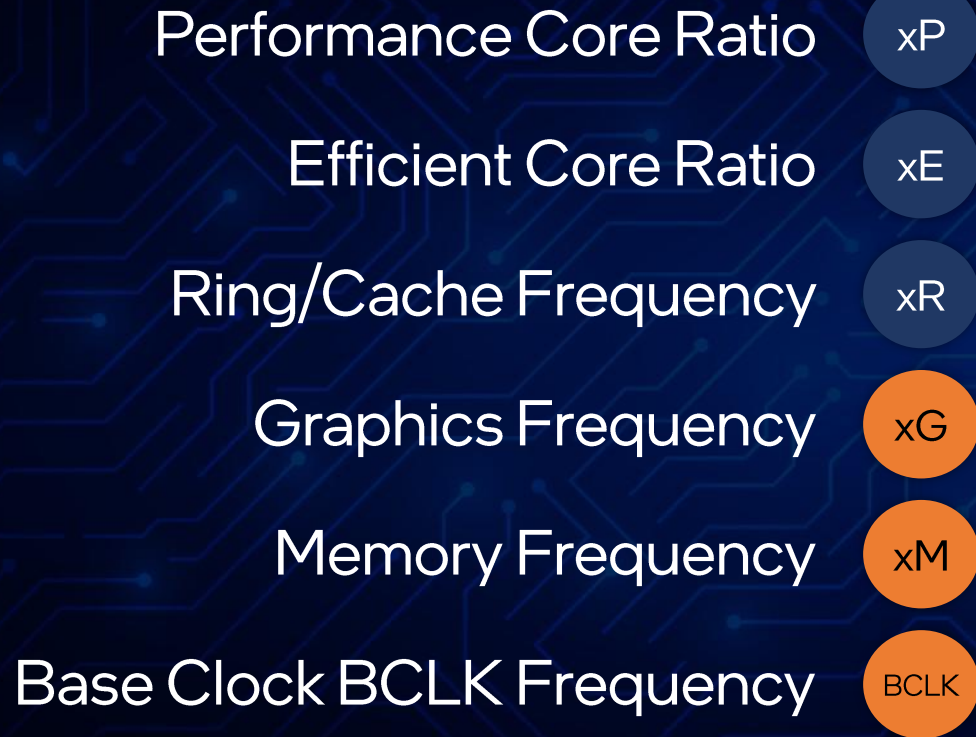
Intel Core i5-12600K & Intel Core i5-12600KF

Feature/Capability	Z690
Processor SKUs Supported	All SKUs
IA and BLCK Overclocking	✓
Memory Overclocking	✓

Maximum overclocking potential when pairing a Z690 chipset with a 12th Gen K SKU



# Overclocking Architecture



**Flexible architecture enables new overclocking potential**



# Tuning Knobs Improve Overclocking Potential

## Common knobs

- AVX Offsets & AVX Disable
- Per-core Hyperthreading enable/disable
- Real-Time Memory Frequency
- Per Core Ratio control
- Voltage controls

## Advanced Overclocking Knobs

- Processor PLL related overrides
- BCLK Aware Adaptive Voltage
- PEG/DMI OC
- TjMax Offset
- Per Core enable/disable

**New tuning controls for both mainstream and extreme overclockers**  
**Over 20 tuning knobs available!**



# Intel® Extreme Tuning Utility 7.5 Enhancements

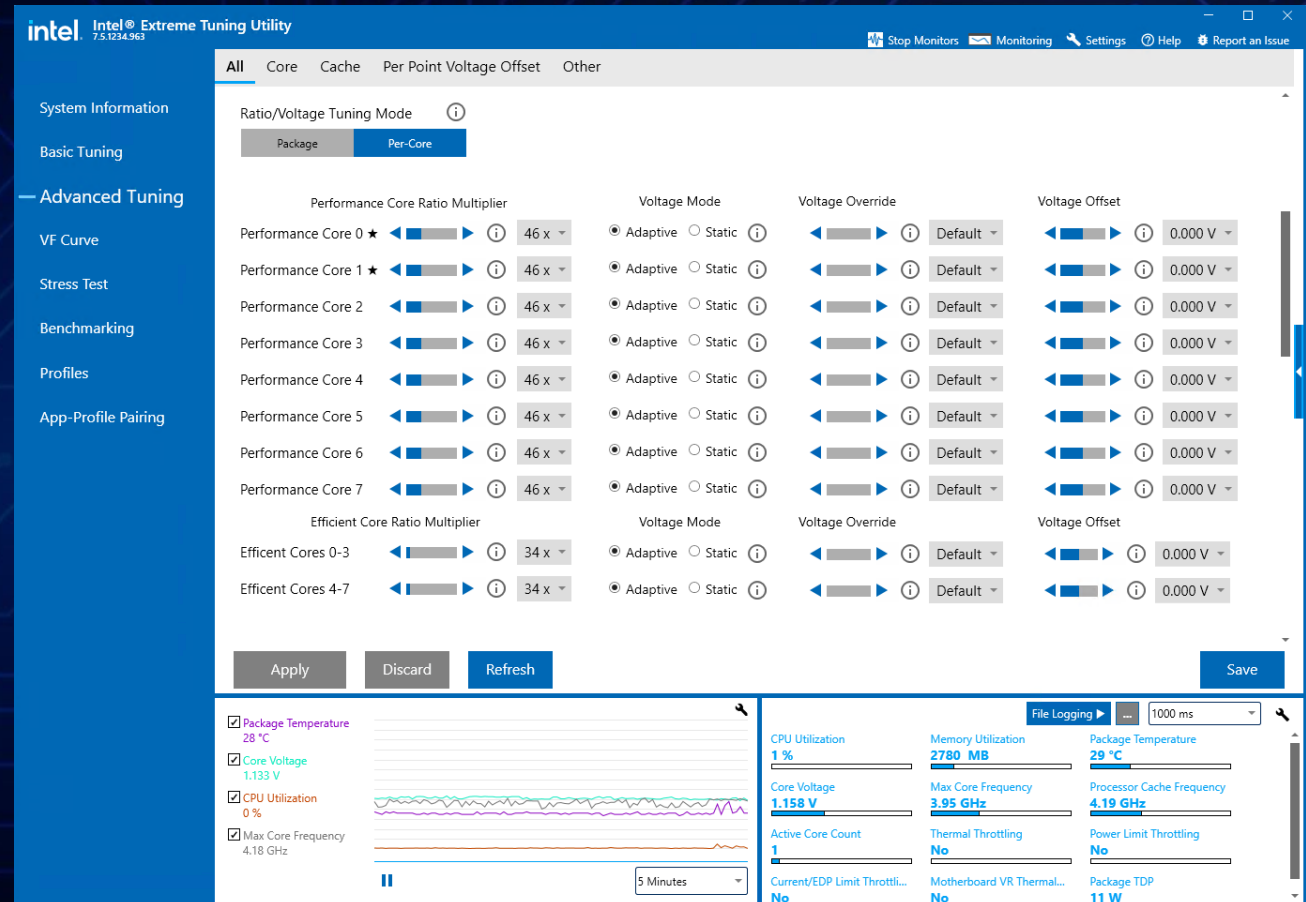
## NEW:

- E-Core ratio control
- Telemetry for E-Cores
- DDR5 support
- XTU Benchmark 2.0 integration on HWBOT.org



## Along with recent additions:

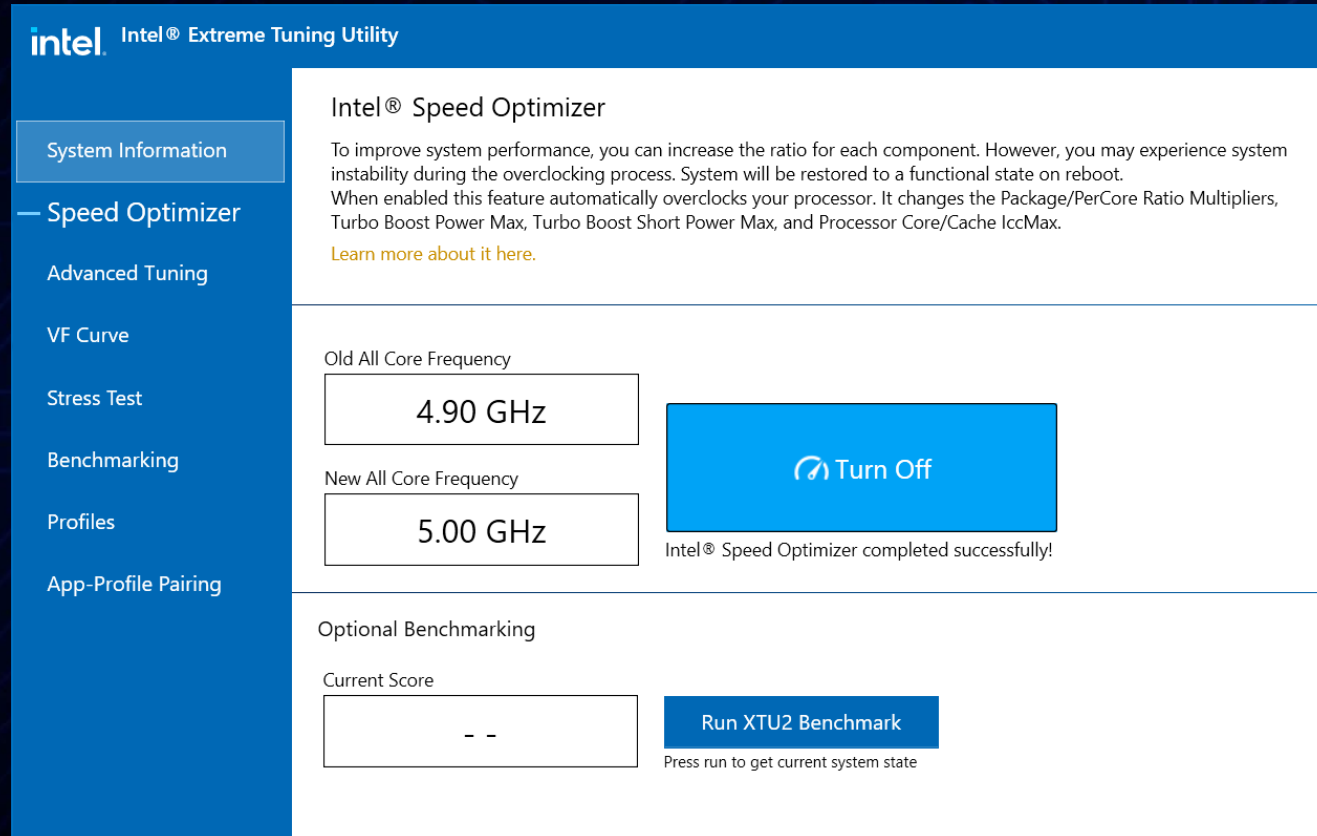
- Real-Time Memory Frequency
- Intel® Speed Optimizer
- System Logging
- ... and more



**Intel XTU has been enhanced to maximize performance of 12th Gen processors**



# One-Click Overclocking with Intel® Speed Optimizer (ISO)



- Designed to simplify overclocking
- Intel ISO changes the P-core and E-core frequency, voltage, and other parameters automatically
- Available in XTU rev 7.5 for i9-12900K & Core i9-12900KF
- Support for additional SKUs in XTU rev7.6

**Intel ISO provides instantaneous and automatic overclocking**



# Simple & Automated Overclocking with Intel® XMP

## Intel Extreme Memory Profile (XMP):

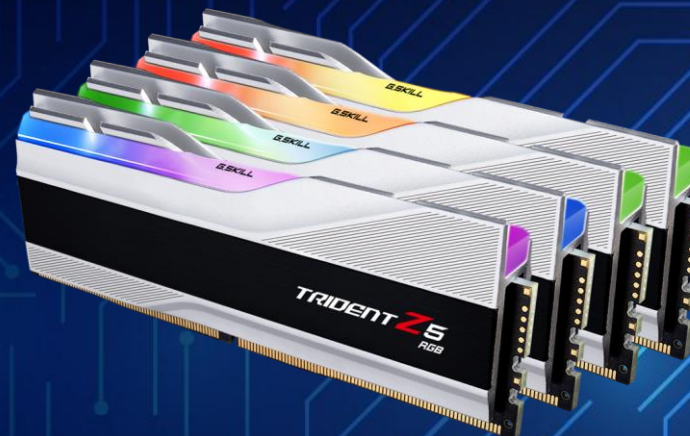
- Intel XMP 1.1 released in 2007; millions of modules sold annually
- Intel XMP makes memory overclocking simple and automatic
- Memory vendors test modules with specific processor, motherboard, and BIOS revisions using Intel's XMP test procedure, in addition to their own qualification process.
- Passing results are posted to XMP page on Intel.com



# Introducing Intel XMP 3.0

## What's NEW:

- More profiles
- Increased flexibility
- Expanded capabilities
- Improved user experience
- Strengthened dependability
- Innovation opportunities for hardware and software developers





# Increased Flexibility with Intel XMP 3.0

## Total XMP profiles increased from 2 to 5

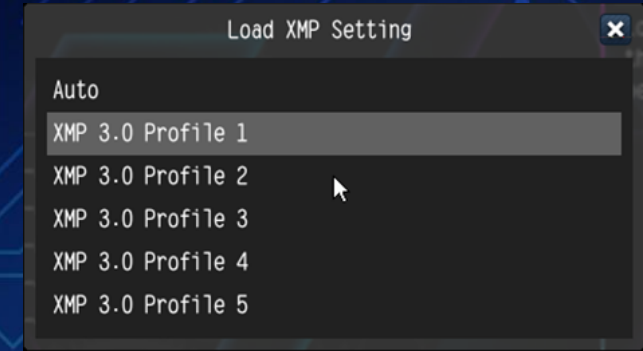
- 3- Vendor profiles
- 2- Rewritable Profiles

## Descriptive Profile Names: up to 16 characters

- Improving user experience

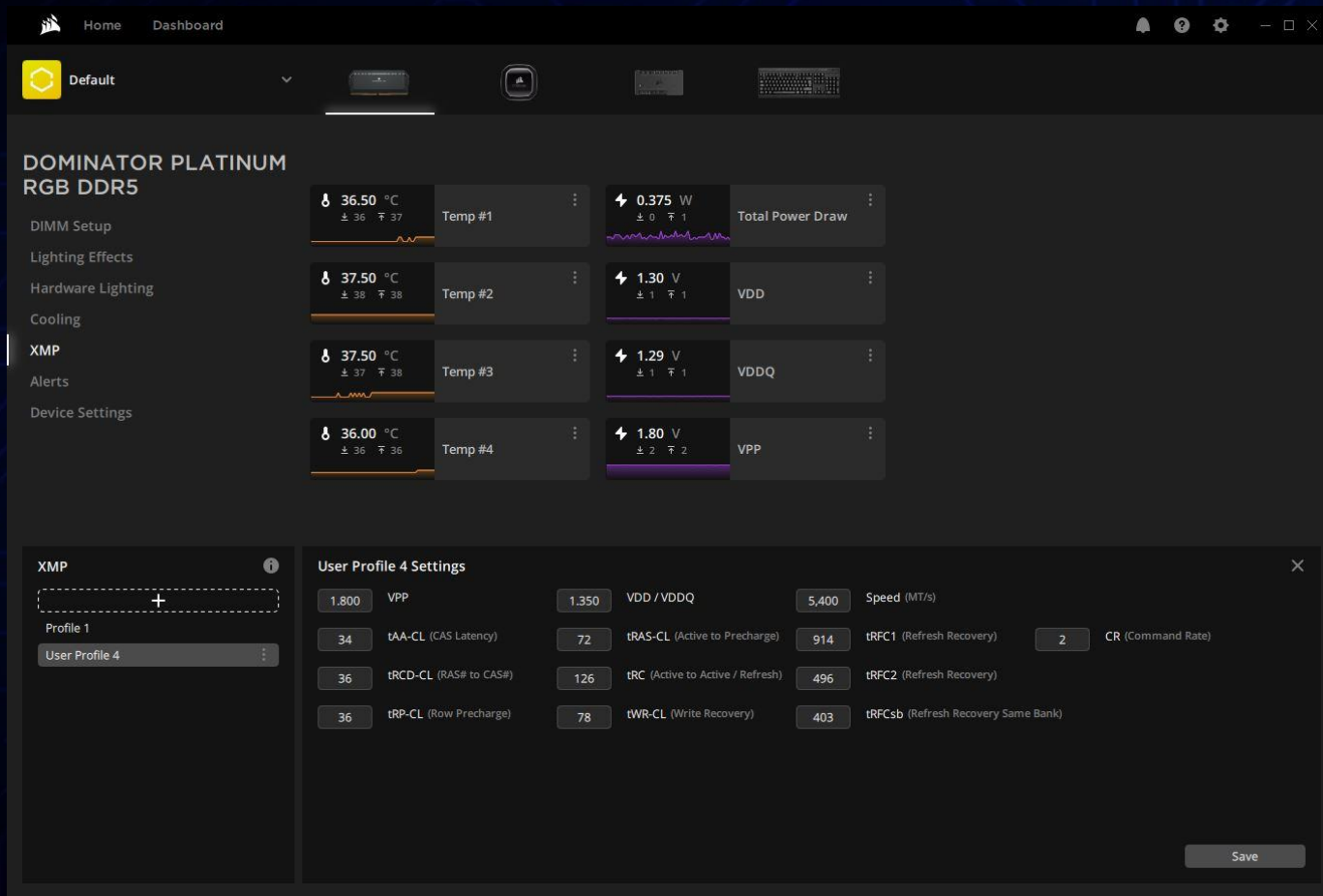
## On DIMM voltage adjustment capabilities

- DDR5 uses a PMIC to derive on module voltage rails
- Rails include: VDD, VDDQ, VPP





# Intel XMP 3.0 Innovation Possibilities



Innovative software from CORSAIR allows users to configure rewritable XMP 3.0 profiles and store back to the DDR5 memory module & much more...





# Intel XMP 3.0 Brings More Profiles, Flexibility, Capabilities, Improved Experience and More!

Continued  
commitment  
to XMP  
innovation

	XMP 1.0	XMP 2.0	XMP 3.0
Memory Technology	DDR3	DDR4	DDR5
Vendor Profiles (static)	2	2	3
Rewriteable Profiles	✗	✗	2
Descriptive Profile Names	✗	✗	✓
CRC Checksum	✗	✗	✓
On Module Voltage Control	✗	✗	✓
Total bytes allocated to XMP	78	102	384

## New XMP 3.0 technical assets:

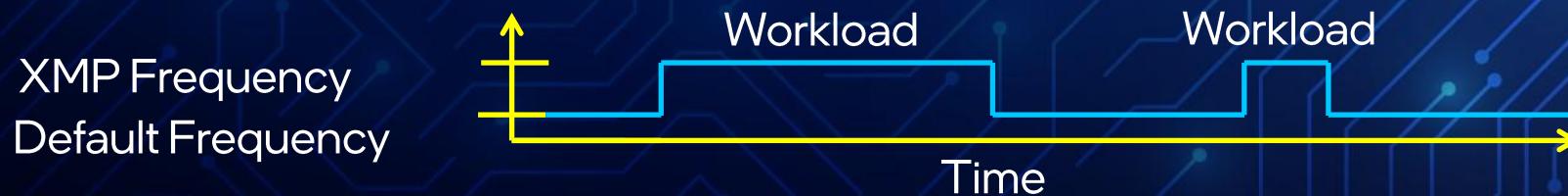
- Updated XMP Serial Presence Detect (SPD) specification
- New Power Management IC (PMIC) requirements
- Updated Vender Self Certification plan





# Intel® Dynamic Memory Boost Technology

- New intelligent memory overclocking feature providing performance on demand
  - 12th Gen systems that support memory overclocking and use Intel® XMP certified memory are eligible
  - DDR4 or DDR5 Intel XMP certified modules are required
  - Feature enabled via BIOS, automatically sets up XMP and base performance modes.
- Provides intelligent switching between JEDEC standard and Intel® XMP profiles to enable greater platform level performance when needed, reverts to lower bandwidth when not in use



**Intel Dynamic Memory Boost Technology delivers intelligent memory overclocking performance on demand**



# Overclocking on 12th Gen Intel Core



E-core Overclocking

DDR5 with XMP 3.0

Intel Dynamic Memory Boost

Intel XTU with ISO for 1-click Overclocking





# 12th Gen Intel Core Desktop SKUs

Marcus Kennedy  
General Manager

Gaming, Creator, and Esports Segment

The Intel logo, consisting of the word "intel" in a white, lowercase, sans-serif font, with a registered trademark symbol (®) to its upper right. The logo is positioned on a blue square background that is part of a larger graphic element in the bottom left corner of the slide.



# Unlocked 12th Gen Intel® Core™ Desktop Processors

Processor Number	Processor Cores (P+E) <sup>3</sup>	Processor Threads <sup>4</sup>	Intel® Smart Cache (L3)	Total L2 Cache	Processor Turbo Frequency			Processor Base Frequency		Unlocked <sup>1</sup>	Processor Graphics	Total CPU PCIe Lanes	Max Memory Speed <sup>2</sup>	Memory Channels	Maximum Memory Capacity <sup>2</sup>	Processor Base Power (W)	Maximum Turbo Power (W)	RCP Pricing (USD 1K)
					Intel® Turbo Boost Max Technology 3.0 Frequency (GHz) <sup>4</sup>	P-core Max Turbo Frequency (GHz) <sup>5</sup>	E-core Max Turbo Frequency (GHz) <sup>5</sup>	P-core Base Frequency (GHz) <sup>5</sup>	E-core Base Frequency (GHz) <sup>5</sup>									
Socket LGA 1700 Performance																		
i9-12900K	16 (8P + 8E)	24	30MB	14MB	Up to 5.2	Up to 5.1	Up to 3.9	3.2	2.4	√	Intel® UHD Graphics 770	20	DDR5 4800 MT/s DDR4 3200 MT/s	2	128GB	125	241	\$589
i9-12900KF	16 (8P + 8E)	24	30MB	14MB	Up to 5.2	Up to 5.1	Up to 3.9	3.2	2.4	√	n/a	20	DDR5 4800 MT/s DDR4 3200 MT/s	2	128GB	125	241	\$564
i7-12700K	12 (8P + 4E)	20	25MB	12MB	Up to 5.0	Up to 4.9	Up to 3.8	3.6	2.7	√	Intel® UHD Graphics 770	20	DDR5 4800 MT/s DDR4 3200 MT/s	2	128GB	125	190	\$409
i7-12700KF	12 (8P + 4E)	20	25MB	12MB	Up to 5.0	Up to 4.9	Up to 3.8	3.6	2.7	√	n/a	20	DDR5 4800 MT/s DDR4 3200 MT/s	2	128GB	125	190	\$384
i5-12600K	10 (6P + 4E)	16	20MB	9.5MB	n/a	Up to 4.9	Up to 3.6	3.7	2.8	√	Intel® UHD Graphics 770	20	DDR5 4800 MT/s DDR4 3200 MT/s	2	128GB	125	150	\$289
i5-12600KF	10 (6P + 4E)	16	20MB	9.5MB	n/a	Up to 4.9	Up to 3.6	3.7	2.8	√	n/a	20	DDR5 4800 MT/s DDR4 3200 MT/s	2	128GB	125	150	\$264

Intel® processor numbers are not a measure of performance. Processor numbers differentiate features within each processor family, not across different processor families.

All processors support Intel® Virtualization Technology (Intel® VT-x).

- Unlocked features are present with select chipsets and processor combinations. 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.
- Memory speeds are associated with 1DPC configurations. Maximum memory capacity of 128GB is achievable with 2DPC configuration.
- Processor cores listed first are the total number of cores in the processor. The number of Performance-cores and the number of Efficient-cores are listed in parentheses (P+E).
- Intel® Hyper-Threading Technology and Intel® Turbo Boost Max Technology 3.0 are only available on Performance-cores.
- Efficient-core frequencies are lower to optimize power usage. The frequency of cores and core types varies by workload, power consumption and other factors. Visit <https://www.intel.com/content/www/us/en/architecture-and-technology/turbo-boost/turbo-boost-technology.html> for more information.





# Closing Remarks

Mandy Mock

Vice President & General Manager  
Desktop, Workstation, and Channel Group

intel®



# Unlocked 12th Gen Intel Core Desktop Processors



**World's Best  
Gaming Processor  
Best Overclocking  
Experience  
Giant Leap for  
Content Creation**

As measured by unique features and superior in-game benchmark mode performance (score or frames per second) on majority of the 31 game titles tested (as of Oct 1, 2021), including in comparison to AMD Ryzen 5950X. Based on enhanced overclocking ability enabled by Intel's comprehensive tools and unique architectural tuning capabilities. Overclocking may void warranty or affect system health. Learn more at [intel.com/overclocking](https://www.intel.com/overclocking). For workloads & configurations visit [www.intel.com/PerformanceIndex](https://www.intel.com/PerformanceIndex). Results may vary.



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1. Performance hybrid architecture combines two new core microarchitectures, Performance-cores (P-cores) and Efficient-cores (E-cores), on a single processor die. Select 12th Gen Intel® Core™ processors (certain 12th Gen Intel Core i5 processors and lower) do not have performance hybrid architecture, only P-cores.
2. Built into the hardware, Intel® Thread Director is provided only in performance hybrid architecture configurations of 12th Gen Intel® Core™ processors; OS enablement is required. Available features and functionality vary by OS.
3. DDR5 Memory speeds are associated with 1DPC configurations. For additional 2DPC configuration details refer to the Alder Lake Processor External Design Specification (EDS), Doc ID 619501.
4. CPU PCIe 5.0 lanes are only validated for discrete graphics (x16) and PCIe storage (1x4). 1x16 bifurcated to 2x8 provides discrete graphics (x8) + additional storage configuration support (1x8).
5. Unlocked features are present with select chipsets and processor combinations. 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.
6. Intel® Optane™ memory requires specific hardware and software configuration. Visit [intel.com/OptaneMemory](https://intel.com/OptaneMemory) for configuration requirements.

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