Blueprint Series
12th Gen Intel® Core™ Processors
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
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. For workloads & configurations visit 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
12th Gen Intel Core Desktop Platform Overview

Marcus Kennedy
General Manager
Gaming, Creator, and Esports Segment
12th Gen Intel® Core™ Desktop Processors

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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, 2023), 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. For workloads & configurations visit www.Intel.com/PerformanceIndex. Results may vary.
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

**Performance-cores**
- Optimized for handling single & lightly-threaded performance
- Enhancing gaming and productivity workload

**Efficient-cores**
- Optimized for handling scaling highly-threaded workloads
- Minimizing interruptions from background task management

Illustration indicates 8P+8E configuration, not to scale.
19%

Performance Improvement at ISO Frequency

SPEC CPU 2017, SYSmark25, Crossmark, PCMark10, WebXPRT3, Geekbench5.4.1

Geomean of Performance core (ADL) vs. Cypress Cove (RKL) Core @ ISO 3.3GHz Frequency

For workloads and configurations visit www.intel.com/ArchDay2. Claims: Results may vary.
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

For workloads & configurations visit: www.Intel.com/PerformanceIndex. Results may vary.
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)³
- **NEW** Processor PCIe 5.0 (up to 16 lanes)⁴
- **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 overclocking⁴
- **ENHANCED** Intel® UHD graphics driven by Xe Architecture¹

## 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)⁴
- Intel® Optane™ memory support¹⁵
- Intel® Killer™ Wi-Fi 6/6E

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¹ Available only on 12th Gen Intel® Core™ processors featuring integrated graphics.
² Discrete Thunderbolt™ 4 technology is only validated and supported from Intel® 600 Series Chipset PCIe lanes.
³ 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.
⁴ For workloads & configurations visit www.Intel.com/PerformanceIndex. Results may vary.
First in Platform Innovation

**PCle 5.0**
- Leadership in I/O transitions
- Driving PCIe 5.0 devices
- Driving dGfx & Storage upgrades
- Enabling 2x I/O throughput

16 lanes of PCIe 5.0 from the CPU

**DDR5**
- Innovation in Memory Capabilities
- Leading the Industry Transition
- Faster Speeds & Higher Bandwidth
- Enhanced Workflow Productivity

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

For workloads & configurations visit www.intel.com/PerformanceIndex. Results may vary. See notices and disclaimers 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

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Integrated Intel® Wi-Fi 6E (Gig+)
Intel® 2.5GBase-T MAC/PHY Ethernet
Intel® Integrated 10/100/1000 MAC
USB I/O: Up to 4 x USB 3.2 Gen 2x2 Ports, Up to 10 x USB 3.2 Gen 2x1 Ports, 14 x USB 2.0 Ports
DMI Gen 4.0 – 8x Lanes
Intel® Extreme Tuning Utility Support
Intel® Platform Trust Technology
Intel® Management Engine Firmware
SATA 6Gb/s – 8x Lanes

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Intel® Z690 CHIPSET

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* USB 3.2 Gen 2x2 compared to USB 3.2 Gen 2x1 10Gbps
* CPU PCIe lanes are only validated for discrete graphics (x16) and PCIe storage.
* Intel Hybrid Storage devices such as Pyramid Glacier (H2O) can’t attach to CPU PCIe due to PCIe 2x2 requirement.
For workloads & configurations visit 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 3 game titles tested (as of Oct 1, 2021), including in comparison to AMD Ryzen 5950X.
For workloads & configurations visit 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. Results may vary.
Leadership Gaming Performance

-3%  PAR  +8%  +11%  +14%  +15%  +16%  +20%  +30%

As measured by unique features and superior in-game benchmark mode performance of 12th Gen Intel® Core™ i9-12900K with Z590 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. Results may vary. Other names and brands may be claimed as the property of others.
Giant Leap for Content Creation

- +32%
- +36%
- +100%

PugetBench - Premier Pro Overall
PugetBench - Lightroom Classic Overall
Adobe After Effects Pulse Benchmark

For workloads & configurations visit www.intel.com/PerformanceIndex. Results may vary.
Content is King: Enabling the Ecosystem

Adobe After Effects
Adobe Premiere Pro
Adobe Photoshop Lightroom Classic
Autodesk Revit
Autodesk Maya
Autodesk Arnold
Adobe Luminar
VEGAS Pro

Not a comprehensive list of customers and partners.
Software Enabling, 12th Gen Intel Core Performance, Hybrid and Power Definitions

Guy Therien
Intel Fellow
Software Ecosystem Enablement for Hybrid Platforms

Windows 11
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

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

For workloads & configurations visit www.Intel.com/Performanceindex. Results may vary.
Power Definition Updates

12th Gen Intel Core

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

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

For workloads & configurations visit www.Intel.com/PerformanceIndex. Results may vary.
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/PerformanceIndex. Results may vary.
# Measuring Performance Hybrid

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

**Legend**

- **Interactive**: < 10 Secs
- **Tasks**: ~ A Few Mins
- **Jobs**: ~ Long Duration

User Initiated

- **Experiential Metrics**: Experience Level/Quality

Gaming

- **Metrics**: Avg Framerate

System Initiated

For workloads & configurations visit www.intel.com/PerformanceIndex for additional details.
Gaming Workflow

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

When run concurrently, higher fps than Intel Core i9-11900K

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

For workloads & configurations visit www.intel.com/PerformanceIndex. Results may vary.
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/PerformanceIndex. Results may vary.
Content Creation Workflow

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

If run serially

- Task 1: Import RAW images
  - 8% Faster
- Task 2: Export as JPEG
  - 92% Faster
- Task 3: Export edited videos
  - 5% Faster

29% faster than Intel Core i9-11900K

When run concurrently

- Task 1: Import RAW images
  - 16% Faster
- Task 2: Export as JPEG
  - 98% Faster
- Task 3: Export edited videos
  - 38% Faster

47% faster than Intel Core i9-11900K

Take photos and record videos...

For workloads & configurations visit: www.intel.com/PerformanceIndex. Results may vary.
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. 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/PerformanceIndex. Results may vary.
Measuring 12th Gen Intel Core Performance

- Leap in Gaming Performance
- Performance Hybrid for Multi-Tasking
- Real-World Workloads

Performance hybrid architecture not available on certain 12th Gen Intel Core processors. For workloads & configurations visit www.Intel.com/PerformanceIndex. Results may vary.
Overclocking

Dan Ragland
Principal Engineer
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

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

Performance Core Ratio  xP
Efficient Core Ratio    xE
Ring/Cache Frequency   xR
Graphics Frequency     xG
Memory Frequency       xM
Base Clock BCLK Frequency BCLK

Flexible architecture enables new overclocking potential

Diagram is for illustrative purposes. It is not a precise representation of the microarchitecture.
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...

Other names and brands may be claimed as the property of others.
Intel XMP 3.0 Brings More Profiles, Flexibility, Capabilities, Improved Experience and More!

<table>
<thead>
<tr>
<th>Feature</th>
<th>XMP 1.0</th>
<th>XMP 2.0</th>
<th>XMP 3.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Memory Technology</td>
<td>DDR3</td>
<td>DDR4</td>
<td>DDR5</td>
</tr>
<tr>
<td>Vendor Profiles (static)</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Rewriteable Profiles</td>
<td>✗</td>
<td>✗</td>
<td>2</td>
</tr>
<tr>
<td>Descriptive Profile Names</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>CRC Checksum</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>On Module Voltage Control</td>
<td>✗</td>
<td>✗</td>
<td>✓</td>
</tr>
<tr>
<td>Total bytes allocated to XMP</td>
<td>78</td>
<td>102</td>
<td>384</td>
</tr>
</tbody>
</table>

New XMP 3.0 technical assets:
- Updated XMP Serial Presence Detect (SPD) specification
- New Power Management IC (PMIC) requirements
- Updated Vendor Self Certification plan

Continued commitment to XMP innovation
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
## Unlocked 12th Gen Intel® Core™ Desktop Processors

<table>
<thead>
<tr>
<th>Processor Number</th>
<th>Processor Cores (P+E)</th>
<th>Processor Threads</th>
<th>Intel® Smart Cache (L3)</th>
<th>Total L2 Cache</th>
<th>Processor Turbo Frequency</th>
<th>Processor Base Frequency</th>
<th>Unlocked</th>
<th>Processor Graphics</th>
<th>Total CPU PCIe Lanes</th>
<th>Max Memory Speed</th>
<th>Memory Channels</th>
<th>Maximum Memory Capacity</th>
<th>Processor Base Power (W)</th>
<th>Maximum Turbo Power (W)</th>
<th>RCP Pricing (USD/k)</th>
</tr>
</thead>
<tbody>
<tr>
<td>i9-12900K</td>
<td>16 (8P + 8E)</td>
<td>24</td>
<td>30MB</td>
<td>14MB</td>
<td>Up to 5.2</td>
<td>Up to 5.1</td>
<td>Up to 3.9</td>
<td>Intel® UHD Graphics 770</td>
<td>20</td>
<td>DDR5 4800 MT/s</td>
<td>DDR4 3200 MT/s</td>
<td>2</td>
<td>128GB</td>
<td>125</td>
<td>241</td>
</tr>
<tr>
<td>i9-12900KF</td>
<td>16 (8P + 8E)</td>
<td>24</td>
<td>30MB</td>
<td>14MB</td>
<td>Up to 5.2</td>
<td>Up to 5.1</td>
<td>Up to 3.9</td>
<td>n/a</td>
<td>20</td>
<td>DDR5 4800 MT/s</td>
<td>DDR4 3200 MT/s</td>
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<td>241</td>
</tr>
<tr>
<td>i7-12700K</td>
<td>12 (8P + 4E)</td>
<td>20</td>
<td>25MB</td>
<td>12MB</td>
<td>Up to 5.0</td>
<td>Up to 4.9</td>
<td>Up to 3.8</td>
<td>Intel® UHD Graphics 770</td>
<td>20</td>
<td>DDR5 4800 MT/s</td>
<td>DDR4 3200 MT/s</td>
<td>2</td>
<td>128GB</td>
<td>125</td>
<td>190</td>
</tr>
<tr>
<td>i7-12700KF</td>
<td>12 (8P + 4E)</td>
<td>20</td>
<td>25MB</td>
<td>12MB</td>
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<td>128GB</td>
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<td>190</td>
</tr>
<tr>
<td>i5-12600K</td>
<td>10 (6P + 4E)</td>
<td>16</td>
<td>20MB</td>
<td>9.5MB</td>
<td>n/a</td>
<td>Up to 4.9</td>
<td>Up to 3.6</td>
<td>Intel® UHD Graphics 770</td>
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<td>2</td>
<td>128GB</td>
<td>125</td>
<td>150</td>
</tr>
</tbody>
</table>

1. 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).
2. Unlock 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.
3. Processor cores are listed first and are associated with 2DPC configurations. Maximum memory capacity of 128GB is achievable with 2DPC configuration.
4. Intel® Hyper-Threading Technology and Intel® Turbo Boost Max Technology 3.0 are only available on Performance-cores.
Closing Remarks

Mandy Mock
Vice President & General Manager
Desktop, Workstation, and Channel Group
Unlocked 12th Gen Intel Core Desktop Processors

World’s Best Gaming Processor
Best Overclocking Experience
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What’s Next?

Join us for Innovation on Oct 27-28, 2021
Notice & Disclaimers

Performance varies by use, configuration and other factors. Learn more at www.Intel.com/PerformanceIndex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See www.Intel.com/PerformanceIndex for configuration details.

No product or component can be absolutely secure.

Your costs and results may vary.

Intel technologies may require enabled hardware, software or service activation.

6 GHz Wi-Fi 6E operation requires use of Intel® Wi-Fi 6E (Gig+) products in conjunction with operating systems and routers/APs/Gateways that support Wi-Fi 6E, together with regional spectrum allocation & required regulatory certifications. Visit www.intel.com/PerformanceIndex/connectivity for details.

 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.

Results that are based on systems and components as well as results that have been estimated or simulated using an Intel Reference Platform (an internal example new system), internal Intel analysis or architecture simulation or modeling are provided to you for informational purposes only. Results may vary based on future changes to any systems, components, specifications or configurations.

All information provided here is subject to change without notice. Contact your Intel representative to obtain the latest information.

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 IDPC 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 (x4). x16 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 for configuration requirements.

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