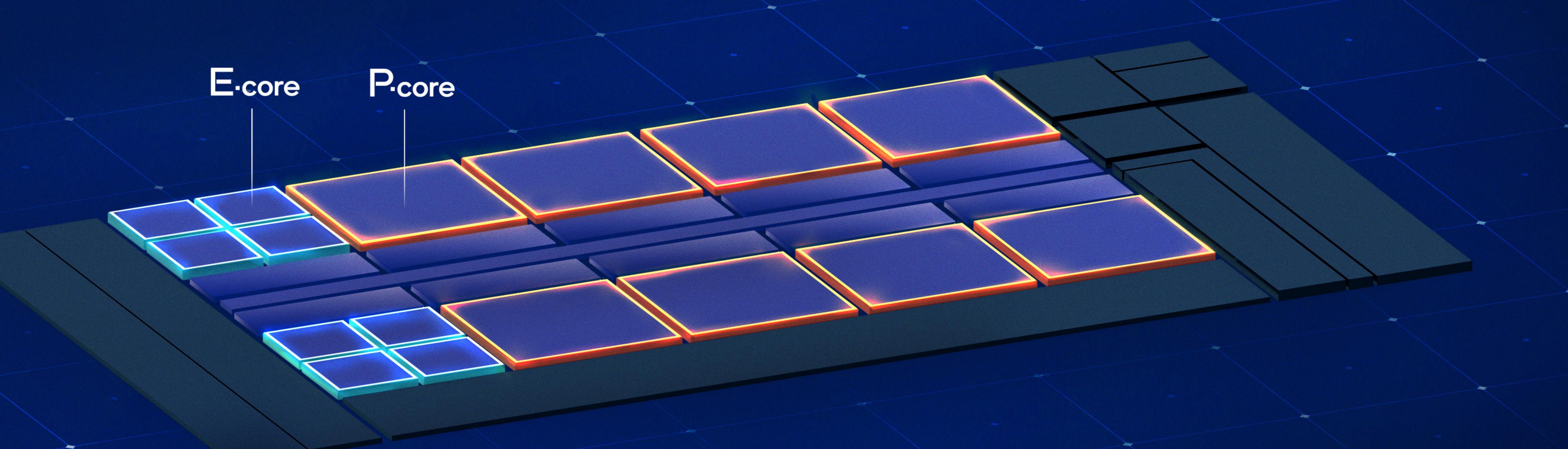
12th Gen Intel® Core™: performance hybrid architecture

Alder Lake harnesses performance and efficiency in Intel's biggest architectural shift in a decade. Performance-cores and Efficient-cores work together with help from the Intel® Thread Director in a flexible system that adapts to complex workflows that blend foreground and background tasks.







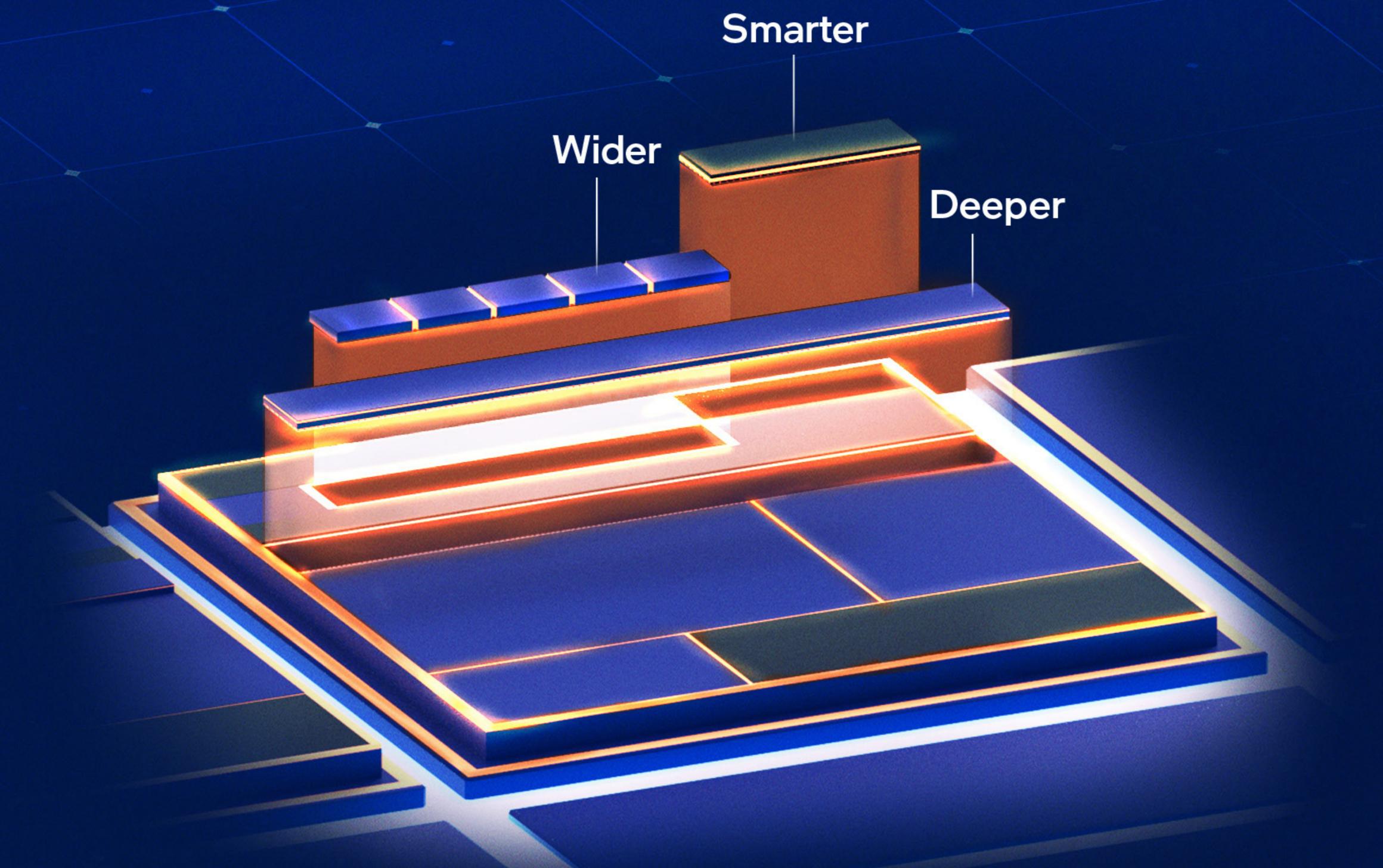


Performance-cores

Built for raw speed and lower latency to push single-threaded performance to the limit.

Take on high-priority tasks like gaming, content creation, and applications that involve AI.

Higher performance than the last generation at the same frequency.



Wider: more decoders and execution ports, along with bigger buffers to crunch complex code.

Deeper: bigger buffer for reordering instructions, more physical registers, and a larger scheduling window.

Smarter: better prefetch and branch prediction put the right data within reach and improve the flow of operations.





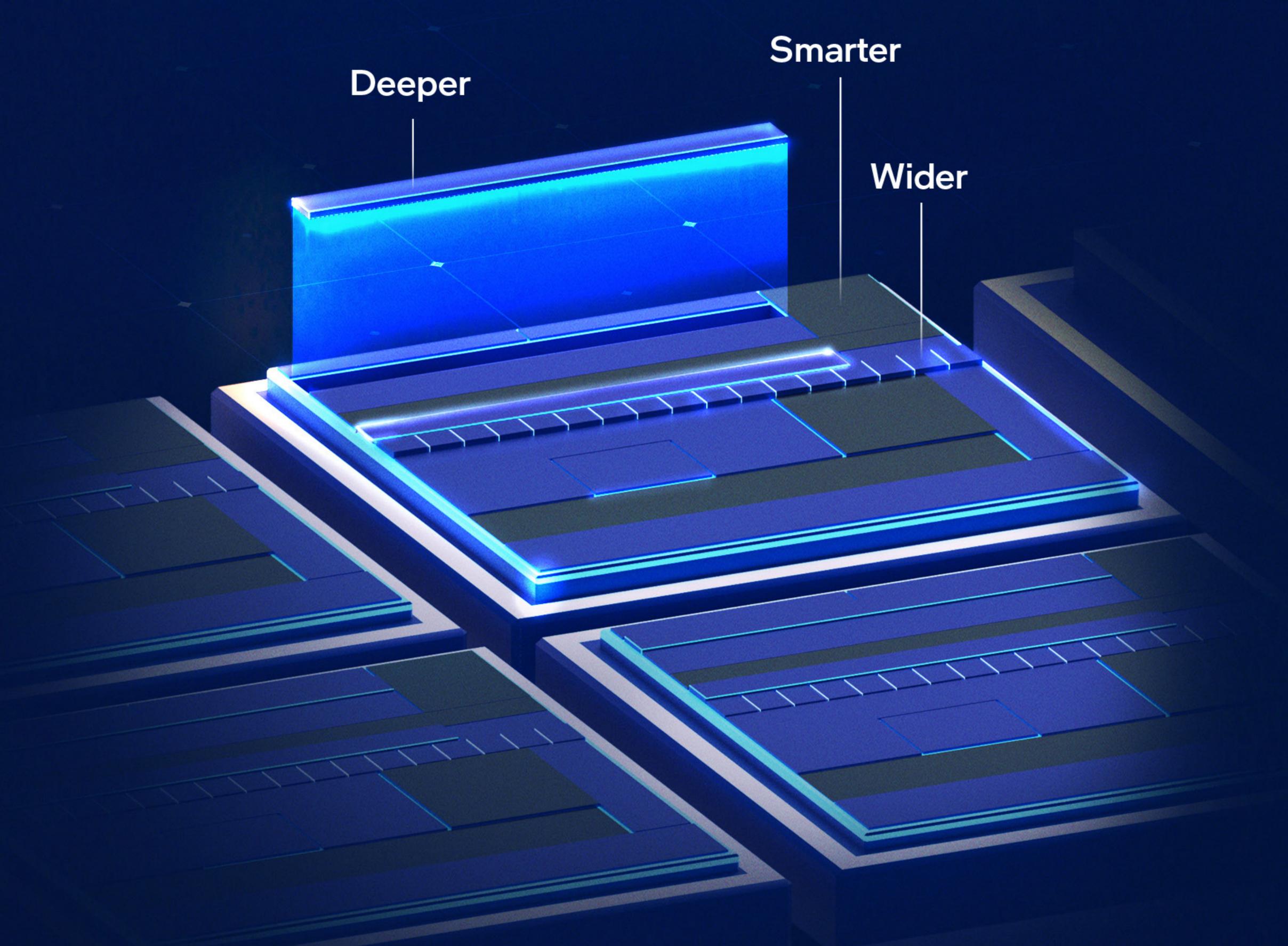


Efficient-cores

Designed to enable wide dynamic range by using power and die area more efficiently.

Scale in groups of four to increase multi-threaded performance and take on background tasks like software updates, cloud syncing, and refreshing email.

More throughput than Skylake in quad-thread configurations.



Deeper: large instruction cache can decode instruction length on demand to accelerate modern workflows.

Smarter: branch prediction minimizes wasted work and improves the flow through the pipeline.

Wider: 17 execution ports with a large out-of-order window to increase parallelism and performance.

Intel® Thread Director

Uses real-time feedback from the hardware to help the OS scheduler assign the right task to the right core at the right time.



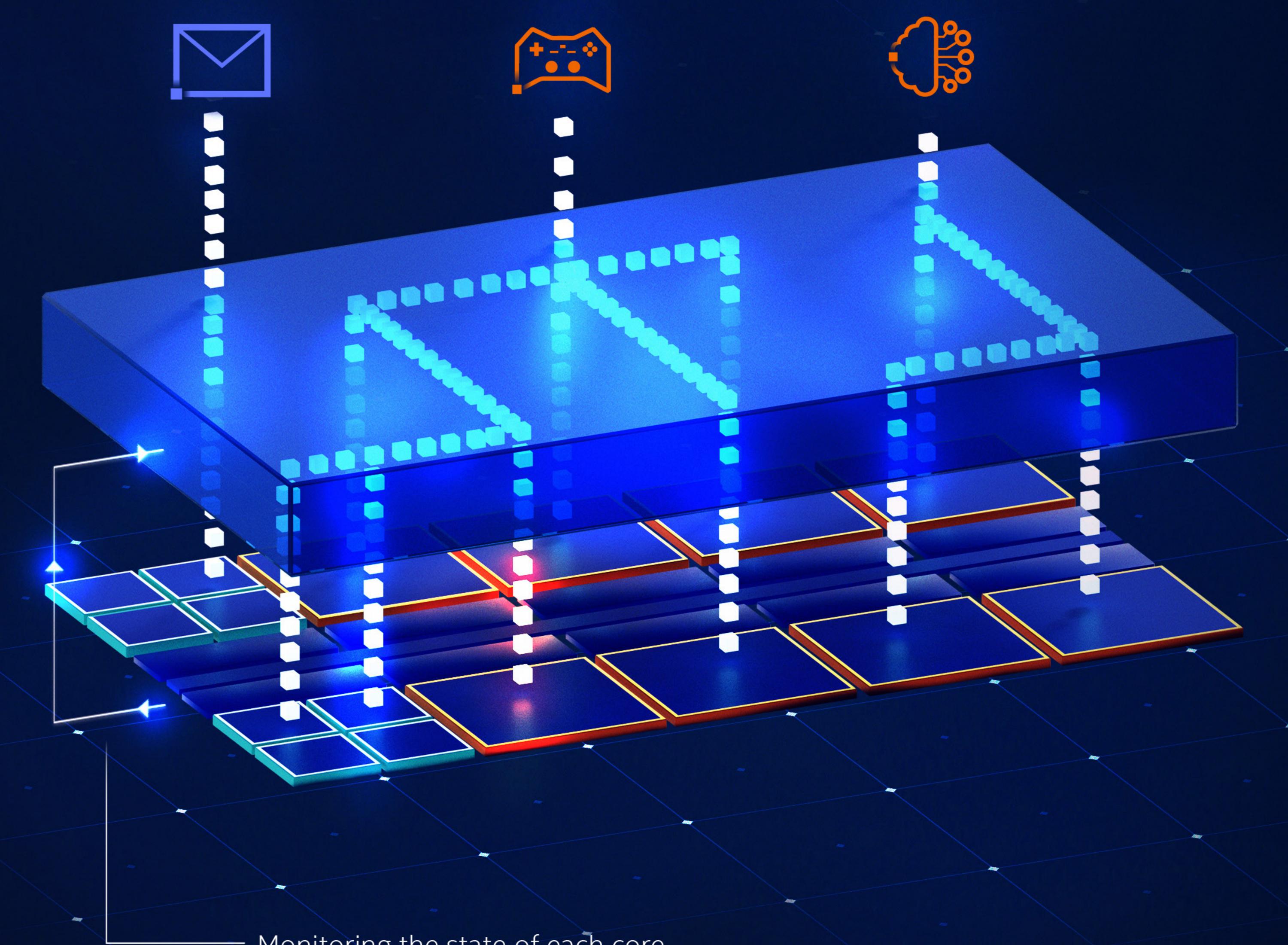
High-priority tasks like gaming are assigned to available P-cores.



Background tasks like email and cloud syncing run on the E-cores.



When a new high-priority task starts, like an app that requires AI, the Thread Director suggests which existing tasks to reassign to the E-cores to make room for the new task on the P-cores.



Optimized for Windows 11

The Intel® Thread Director team worked closely with Microsoft to enable a seamless experience in Windows 11.

Monitoring the state of each core, the instruction mix, and other telemetry helps the OS scheduler allocate work more intelligently.