Intel Unveils Lunar Lake Architecture

Lunar Lake sets a new standard for performance and efficiency in next-generation client products.

June 4, 2024 — At the Intel Technology Tour in Taiwan, Yaron Alankry, vice president of Client Computing Group and general manager of Silicon Engineering, and Arik Gihon, senior principal engineer of SoC Architecture, detailed the architecture behind Lunar Lake processors, which will deliver huge improvements to performance and power efficiency when launched this year.

Intel designed Lunar Lake to deliver:
- Breakthrough x86 power efficiency.
- A massive leap in graphics for a great mobile gaming experience.
- Unmatched future-ready AI compute for an outstanding user experience.
- Exceptional core performance.
- Extended scalability to scale up Lunar Lake architecture to the next generations.

Lunar Lake Overview

Lunar Lake's microarchitecture consists of two unique tiles connected through Intel's industry-leading Foveros packaging technology, as well as memory on package:

- **Compute Tile** – A new compute tile contains the latest-generation Efficient-cores (E-cores) and Performance-cores (P-cores), both of which introduce new microarchitecture enhancements and together bring unprecedented x86 efficiency. Also housed on the compute tile are the new X^e2 graphics processing unit (GPU), neural processing unit (NPU 4) and image processing unit (IPU).
  - **X^e2 GPU** – Brings more than 50% more gaming performance and more than 3.5 times the AI throughput over the previous generation, delivering more than 60 tera-operations per second (TOPS) New microarchitecture for the display and media engines delivers a best-in-class visual experience.
  - **NPU 4** – Delivers three times more TOPS over the most recent generation, up to 48 TOPs, to accelerate AI computations with impressively low power.
  - **IPU** – Provides a great camera experience with reduced power.
- **Platform Controller Tile (PCT)** – The PCT is where security and connectivity are integrated. Security components deliver a robust integrated security solution with built-in security engines designed to establish a solid foundation for system protection. The upgraded connectivity suite integrates Wi-Fi 7.0, Bluetooth 5.4, PCIe Gen5 and PCIe Gen4 ports, and Thunderbolt™ 4 ports.
- **Memory on Package** – Enables fast access to data and reduces latency, decreasing the overall power consumption of the system.

Breakthrough Efficiency and Battery Life

Lunar Lake represents a massive leap forward in system-on-chip (SoC) efficiency and sets a new benchmark for performance and power management. The new power delivery integrated controller, enhanced Intel® Thread Director, memory-side cache and improved E-core cluster deliver significant battery life improvements in real-life usages.

These innovations work together to dramatically extend battery life, ensuring Lunar Lake-based laptops last longer on a single charge.

For more information, please contact your Intel CCG representative.

Editor's Notes: *Claims regarding the X^{e}2 GPU were updated on June 4, 2024. Claims regarding battery life were updated on Aug. 5, 2024.*

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