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**“AZƏRBAYCAN HAVA YOLLARI” CJSC**

**NATIONAL AVIATION ACADEMY**

**Topic**: Apple M1 CPU

**Subject**: Operating Systems

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**Group**: 2450i

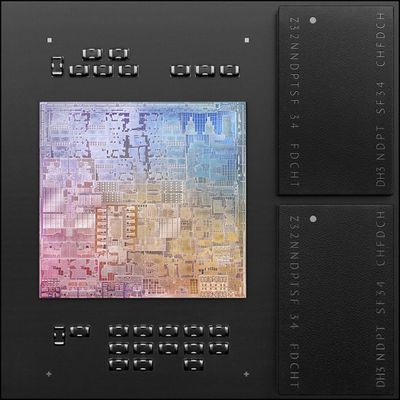
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Apple M1 is a series of [ARM](https://en.wikipedia.org/wiki/ARM_architecture)-based [systems-on-a-chip](https://en.wikipedia.org/wiki/System-on-a-chip) (SoCs) [designed by Apple Inc.](https://en.wikipedia.org/wiki/Apple_silicon) as a [central processing unit](https://en.wikipedia.org/wiki/Central_processing_unit) (CPU) and [graphics processing unit](https://en.wikipedia.org/wiki/Graphics_processing_unit) (GPU) for its [Mac](https://en.wikipedia.org/wiki/Mac_(computer)) [desktops](https://en.wikipedia.org/wiki/Desktop_computer) and [notebooks](https://en.wikipedia.org/wiki/Laptop), and the [iPad Pro](https://en.wikipedia.org/wiki/IPad_Pro) and [iPad Air](https://en.wikipedia.org/wiki/IPad_Air_(5th_generation)) [tablets](https://en.wikipedia.org/wiki/Tablet_computer).



The M1 has four high-performance "Firestorm" and four energy-efficient "Icestorm" [cores](https://en.wikipedia.org/wiki/Multi-core_processor), first seen on the [A14 Bionic](https://en.wikipedia.org/wiki/Apple_A14). It has a [hybrid](https://en.wikipedia.org/wiki/Heterogeneous_computing#Heterogeneous_CPU_topology) configuration similar to [ARM DynamIQ](https://en.wikipedia.org/wiki/ARM_DynamIQ) and Intel's [Lakefield](https://en.wikipedia.org/wiki/Tremont_(microarchitecture)#Mobile_processors_(Lakefield)), [Alder Lake](https://en.wikipedia.org/wiki/Alder_Lake_(microprocessor)) and [Raptor Lake](https://en.wikipedia.org/wiki/Raptor_Lake_(microprocessor)) processors This combination allows power-use optimizations not possible with previous [Apple–Intel architecture](https://en.wikipedia.org/wiki/Apple%E2%80%93Intel_architecture) devices. Apple claims the energy-efficient cores use one-tenth the power of the high-performance ones. The high-performance cores have an unusually large 192 KB of L1 [instruction cache](https://en.wikipedia.org/wiki/CPU_Cache) and 128 KB of L1 data cache and share a 12 MB L2 cache; the energy-efficient cores have a 128 KB L1 instruction cache, 64 KB L1 data cache, and a shared 4 MB L2 cache. The SoC also has a 8MB System Level Cache shared by the GPU.

GPU

The M1 integrates an Apple designed eight-core (seven in some base models) graphics processing unit (GPU). Each GPU core is split into 16 Execution Units, which each contain eight [Arithmetic Logic Units](https://en.wikipedia.org/wiki/Arithmetic_Logic_Unit) (ALUs). In total, the M1 GPU contains up to 128 [Execution units](https://en.wikipedia.org/wiki/Execution_unit) or 1024 ALUs, which Apple says can execute up to 24,576 threads simultaneously and which have a maximum floating point (FP32) performance of 2.6 [TFLOPs](https://en.wikipedia.org/wiki/TFLOPS).

The M1 Pro integrates a 16-core (14 in some base models) graphics processing unit (GPU), while the M1 Max integrates a 32-core (24 in some base models) GPU. In total, the M1 Max GPU contains up to 512 [execution units](https://en.wikipedia.org/wiki/Execution_unit) or 4096 ALUs, which have a maximum floating point (FP32) performance of 10.4 [TFLOPs](https://en.wikipedia.org/wiki/TFLOPS). The M1 Ultra features a 48- or 64-core GPU.

The M1 chipset has 8 [CPU](https://www.trustedreviews.com/explainer/what-is-a-cpu-2950255)cores in total, featuring 4 performance cores (P-cores) and 4 efficiency cores (E-cores). The performance cores ensure that the device can stay powerful and utilise a long-lasting battery, while the efficiency cores ensure that it still being portable enough to go into a tablet or a laptop.

In terms of graphics, you can get the M1 with either 7 or 8 GPU cores, with the former offering more graphical power. Benchmark tests have proved the GPU to be impressive, however, it still offers mostly entry-level performance and it can’t compare to the other chips in the M1 lineup, like the M1 Ultra’s 64-core [GPU](https://www.trustedreviews.com/news/what-is-a-gpu-4150490#:~:text=A%20GPU%2C%20or%20a%20Graphics,useless%20as%20a%20door%20stop.).

Built into the M1 chip, the unified memory architecture lets the CPU, GPU, and other processor components don't need to copy data between one another, and are able to access the same data pool. This brings notable speed and efficiency improvements to the M1. This memory architecture means that the RAM is not user upgradeable, which isn't too much of a surprise because few Macs have user accessible RAM. M1 Macs max out at 16GB RAM, but even the base 8GB is enough for everyday tasks.

There are 16 billion transistors on the M1, which is the most Apple has ever put into a chip for the fastest CPU core available in low-power silicon and unparalleled CPU performance per watt. Apple's chip design has allowed it to create Macs that are faster and more power-efficient than was possible with Intel-designed chips, and further enhancements are available through the new tighter integration of an Apple-designed chip paired with Apple-designed software.

