Apple M1 vs Intel

Main features of the SoC (System on a Chip)

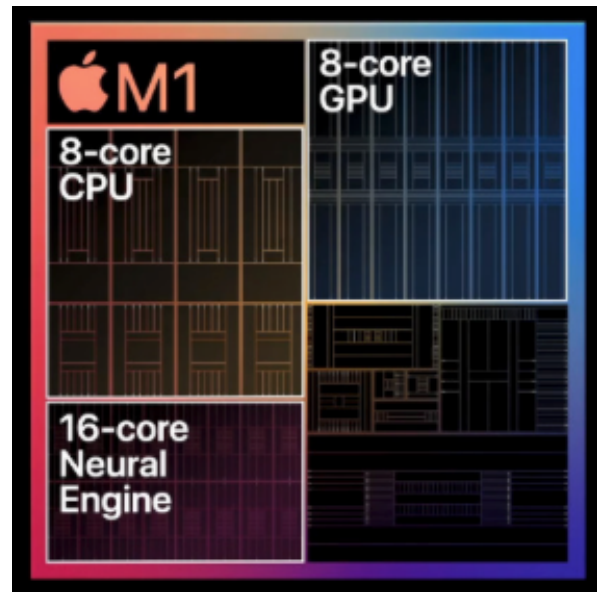8 core CPU
  - 4 performance and 4 efficiency
8 core GPU
16 core Neural Engine (NE)
Memory and SSD are part of the chip
ARM instruction set

Hardware

Mac Mini

Silver only

SSD: 256GB or 512GB

8GB or 16GB memory

No fan.

CPU speed never throttled down because chip never heats up.

MacBook Air

Available with either 7 core CPU or 8 core CPU
Space Gray, Gold, Silver
SSD: 256GB, 512GB, 1TB, or 2TB
8GB or 16GB memory
CPU speed is throttled down when chip gets heated up and fan turns on

MacBook Pro 13"

Space Gray or Silver.
Retina display
8GB or 16GB memory
SSD: 256GB, 512GB, 1TB, or 2TB

Fan turns on when chip gets too hot, but CPU speed never throttled down.

61W USB-C power adapter.

X86 (Intel) apps

Rosetta 2

Needs to be installed to run Intel-based apps.

Windows

No more Boot Camp

Requires virtualization, like VMWare, Parallels, or VirtualBox.

Parallels runs as a Universal app in Big Sur, but it's NOT ready for M1.

Third party apps

As of 2/12 there are 370 apps that are fully M1-compatible and 233 others that work with Rosetta 2, 49 known to not work at all, and up to 4620 untested apps.

iMazing Silicon - scans installed apps to see which ones are M1-compatible. It reports apps in three different categories: Apple, Intel 64, and Universal.

All Apple apps are currently in the Universal category - not even fully M1-compatible

IsAppleSiliconReady.com lists all apps that are M1-compatible

Zoom is fully M1-compatible

If you are using Avast, it doesn't work.

If you are using Sophos Home Free, it works as a Universal app.

NOTE: If graphics performance is a real issue, get the 16" 2019 MacBook Pro for up to 3x the price depending on options selected.

The concept of SoC is that instead of having several IC's performing separate but interconnected functions, such as one chip for the CPU, one for the FPU, and one for the GPU, they are all on one chip, and that includes the graphics memory, the system cache, user memory, and even the SSD.

SoC isn't new. It's been around for a long time. The tiny computers known as Raspberry PI are essentially SoC. Your iOS, iPadOS, and Apple Watch are all SoC.

But the new SoC for Apple computers - which includes the MacBook Pro, the MacBook Air, and the Mini - are all new and redesigned for the larger systems. The A14 chip is a system on a chip containing 11.8 billion transistors. The 11 trillion operations per second of the A14 by itself puts that SoC in the same class as the supercomputers of yesteryear.

The SoC is an ARM-based architecture, which has already been deployed in iOS, iPadOS, and smart watches.

The difference is that Apple has created its own design and fabrication team for SoC.

The advantages of SoC are a reduction in overall system design, it's compact compared to a motherboard with the same functions distributed over several chips, it has better efficiency and performance, it consumes less power, and it is faster to get to market.

The iMac is rumored to be available in late 2021 with some version of the M1. And by the end of 2022, all new Apple computers will have the SoC.

The M1 Mini, even with the limit of 16GB of memory, outperforms all of its predecessors with the most telling evidence being the lack of fan noise and the cool case even running everything I can throw at it at once. The Mini doesn't even have a fan.

The M1 Mini is 3x faster in processing speed with 6x better graphics compared to a 2018 Intel Core i3. But speed isn't the only factor in choosing a Mini for a desktop computer, and benchmarks aren't the best way to check real-life computer usage.

Comparing the time it takes to launch different applications really doesn't amount to anything significant when comparing the M1 Mini to the 2015

MacBook Pro and the 2012 Mini, where all three have 16GB memory and SSD storage. What is significant is that the 2012 Mini running Catalina starts in around 35 seconds, the M1 Mini running Big Sur starts in 48 seconds, and the 2015 MacBook Pro running Big Sur starts in 60 seconds. The only app that launches significantly faster on the M1 Mini is Pages, which is 2 seconds. It is 2.5x faster than the 2015 MacBook Pro and 4x faster than the 2012 Mini. But that's only on the first time after logging in. After that, the difference in launch time for any app is insignificant.

So where is the benefit of an M1? It appears to be just in power consumption and processing speed (which is only about number crunching and not about graphics display speed). Crunching numbers is the M1's forte. It is measured to be anywhere from 2x faster to 6x faster than a comparable Intel Mac. And in my book, that really only matters for processing times greater than 5 seconds for the Intel Mac.

What will bring the M1 (or any computer) to its knees is having to access an external spinning hard drive. So if at all possible, use an SSD for external drives that have to be accessed for specific applications. And keep in mind that there are different speed ratings for external SSDs - either 540MB/s for the 3.1 USB or 1050MB/s for the 3.2 USB.

Other factors in login time include the number of apps that are set to start up when you log in (login items) and the number of icons you have on the Desktop, and whether or not the Finder opens up and is trying to access an external drive.