COMPUTER GURU – *by Don Benjamin*

A Brief History of the Microprocessor

Here's a one-page history of the microprocessor, which debuted forty-seven years ago, and a new breed of chips that break computer speed and battery life records on Windows and Mac computers.

The central processing unit (CPU) inside your computer is the engine that runs applications like Word and Mail, responds to commands, saves files, prints documents, renders webpages, and manages files and folders.

Today's CPUs, or "microprocessors," are typically no more than one or two square inches. Intel unveiled its first microprocessor, the 8086, in June 1978. This "computer-on-a-chip" packed 30,000 transistors and associated components on something small enough to make personal computers a reality.

In 1979, Motorola introduced its microprocessor, the 68000, which Apple used in its first Mac computers. The Motorola and Intel CPUs weren't interchangeable; each used its own instruction set. An application designed on an Intel 8086 couldn't run on a Motorola 68000, so the first Mac and Windows computers weren't compatible.

Sharon seems delighted with her new computer. She probably needs glasses.

For many years, the Intel 8086 and its early progeny dominated the personal PC market – notably the IBM PC – which is why Microsoft developed Windows to run on the 8086 CPU. Over time, Intel introduced faster x86 CPUs like the 80386, Pentium, and Core series. AMD joined in 1982 with its own x86 CPUs. Today's Windows PCs still use x86-based Intel Core or AMD Ryzen CPUs containing *billions* of transistors that can execute *billions* of steps per second.

In 2006, Apple migrated to Intel x86-based CPUs, allowing Mac and Windows to play together. All seemed well.

But there was Trouble in River City. While Windows and Mac laptops were shrinking into their sleek notebook form, the newer x86 CPUs demanded more power, ran hot, and drained computer batteries after only a few hours.

A Call to ARMs

To solve this dilemma, Apple designed its very own microprocessors for its MacBook computers based on the CPUs in its fast and battery-friendly iPhones and iPads. These microprocessors use a simpler instruction set licensed from ARM LLC, are highly energy efficient, and include "neural" memory for AI applications. In 2020, Apple introduced its MacBook with this new ARM-based CPU – dubbed the M1 – and abandoned Intel's x86. Apple rewrote its software to work on both M1 and Intel processors, ensuring compatibility with older Mac computers for the time being.

The new M1 MacBooks handily outperformed most Intel-based Windows computers. To respond, Microsoft developed a new version of Windows 11 to run on Qualcomm's ARM-based Snapdragon CPU found in many Android smartphones and tablets. These computers are part of a new collection of Windows-based "Copilot+ PCs" competitively priced with their traditional Intel and AMD brethren. They're fast, run cool, and have long battery life.

Should you buy a Copilot+ PC? We'll explore this new flavor of Windows computers next month.

If you need help with your iPad, just ask our tech team at: **https://engage.cmaprinceton.org/tech-help**.