

Medical Office Systems, LLC

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The Circle of Computing

Gordon Moore was one of the Co-Founders of Intel Corporation, the giant computer processor maker. He coined “Moore’s Law”, which stated that the transistor count and speed of Personal Computer processors (the brains of the computer, ie: “Chips”) would double in every 2 years. That has been true for the last 35 years, give or take a year here and there. Moore’s Law did have an invisible asterisk at the end of it: he knew eventually the progress would “hit the wall” and halt.

When processors are manufactured, they are cast on a “die” and one measurement of how they are cast is called the “circuit width”. Circuit Width is the size of the tiny little circuits and transistors on the processor chips. What made Moore’s Law work, and the doubling possible, is the ever-decreasing die size and circuit width due to improvements in the manufacturing processes. Moore’s Law was predicted to end in the year 2025, when the circuit width reaches the size of a single atom. That, my friends, is as small as you can get in this universe.

So what did Intel and other processor makers do? They actually “hit the wall” about 7 years ago, and came up with a temporary fix: Dual-Core processors. Dual-Core processors basically are two processor chips on one die. Next, when they hit the wall again, out came the Quad-Core processors (four processors on one die). AMD has an 8-core processor, and Intel actually makes a 15-core XEON processor. Well, even that fix has hit the wall too. Multiple processors mean lots of power and lots of heat. Meanwhile, consumers have gone the other direction: they don’t want super-power desktop computers anymore, they want low-power processors that can go mobile and run on battery power for a day at a time. Like cellphones and tablets for example. Why have a super-power processor running all the time for a low-power task like checking email? **My Prediction: Moore’s law will most likely will end in about 2-3 years for economic and usage reasons.**

AMD saw the writing on the wall two years ago, and made the painful cuts in personnel and capacity to re-focus away from desktops and ultimate processor power to the opposite direction of low-power chips intended for mobile, or low-power tasks. **As of April 2016, Intel has had to make the same radical cuts**, laying off 12,000 workers worldwide. They also are re-focusing on the same low-power chips. So, let’s say you still need a super-power machine, what are you going to do? There are two answers:

Answer #1: There is one manufacturing innovation left: “**Memory on Chip**” processors. This processor gains its speed by packaging what were separate components (processor and memory) into one die. This greatly reduces the distance between processor and memory, thus speeding up calculations. But when this solution also hits the wall in terms of power and heat in about 5 years, the game will absolutely and most definitely be over.

Answer #2: The Cloud. Yup, that over-used term again. You will only be able to gain processor power in the future by essentially renting processor time via a server farm located somewhere in The Cloud. Does this sound like the old-school mainframe time-sharing system? Why yes it is, and for those of us who are north of 30 years old, we have completed the “full circle of computing”: computers started out as mainframes and terminals, then migrated to personal computers, and now essentially we are right back where we started; just substitute a tablet for a terminal and the cloud for the mainframe.

The Cloud is ultimately where all the real processing power will reside in the future. Its already available via Amazon Web Services <https://aws.amazon.com> and other providers. Companies of any size, or individuals like yourself, that need a lot of processor power could call upon 10, 20, hundreds, or thousands of processors to calculate complex problems in seconds from a tablet or phone, anywhere in the world. It’s not some far off future thing: it is the here and now!

-John Becker