Requiem for Moore's Law

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Moore's law states that every 18 months, the speed and memory of one's computer are doubled, assuming constant price. This observation was made in 1965, and had held for more than 40 years after that.From mobile phones to the Internet to digital cameras - Moore's law has practically shaped the life as we know it. Less explicitly - but quite as drastically - Moore's law is responsible for the current structure of scientific computing.

The last decade saw a much-anticipated break-down in the operation of Moore's law, to the point that manufacturers are exploring alternative ways to increase computers' capabilities: multiple CPUs, cloud computing, etc. As applied mathematicians and numerical analysts, we will be among those most affected by these changes. I will try to elucidate the structure of scientific computing as it exists, and the changes likely to be caused by the demise of Moore's law. To illustrate the situation, I will discuss several "fast" numerical techniques, and their interactions with the changing computer hardware.