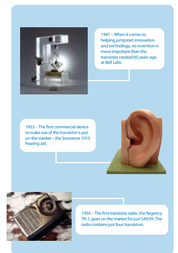
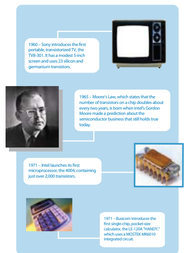
60 YEARS OF THE TRANSISTOR: 1947 – 2007

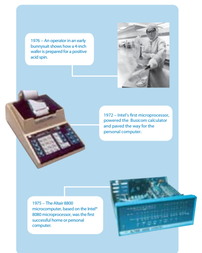
intel Leap ahead

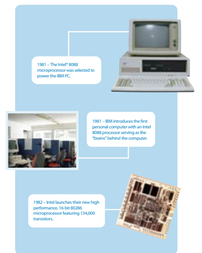
The Revolution Begins

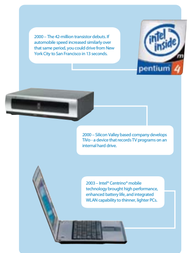
Invented 60 years ago, the transistor is a key building block of today's digital world. Perhaps the most important invention of the 20th century, transistors are found in many devices and are the building blocks of computer chips. Intel, the largest manufacturer of computer chips, continues to innovate to help PCs and laptops become smaller, faster, sleeker and more energy-efficient. Many new applications and inventions powered by transistors have impacted all of our lives over the past 60 years.

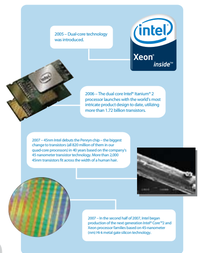












The Revolution Continues

Intel continues to deliver on the promise of Moore's Law with the introduction of powerful multi-core technologies, transforming the way we live, work and play once again.

Moore's Law

In 1965, Intel co-founder Gordon Moore predicted that the number of transistors on a chip would double about every two years. Since then, Moore's Law has fuelled a technology revolution as Intel has exponentially increased the number of transistors integrated into its processors for greater performance and energy efficiency.

Note: Number of transistors is an approximate number.

Year	Processor	Introduced	Initial clock speed	Number of transistors	Manufacturing technology	Comment
1947						The revolution begins
1950						
1960						
1970						
1980						
1990						
2000						
2007						
1971	Intel® 4004 processor	1971	108 KHz	2,300	10µ	The groundbreaking Intel® 4004 processor was introduced into our calculator computing power business.
1972	Intel® 8008 processor	1972	500-800 KHz	3,500	10µ	The Intel® 8008 processor was twice as powerful as the Intel® 4004 processor.
1974	Intel® 8080 processor	1974	2 MHz	4,500	6µ	The Intel® 8080 processor made video games and home computers possible.
1978	Intel® 8086 processor	1978	5 MHz	29,000	3µ	The Intel® 8086 processor was the first 16-bit processor and delivered about ten times the performance of its predecessors.
1979	Intel® 8088 processor	1979	5 MHz	29,000	3µ	A pivotal sale to IBM's new personal computer division made the Intel® 8088 processor the basis of IBM's "new" product – the IBM PC.
1982	Intel® 286 processor	1982	6 MHz	134,000	1.5µ	The Intel® 286 was the first Intel processor that could run all the software written for its predecessor.
1985	Intel386™ processor	1985	16 MHz	275,000	1.5µ	The Intel386™ processor could run multiple software programs at once and boasted 275,000 transistors – more than 100 times as many as the original Intel® 4004.
1989	Intel486™ processor	1989	25 MHz	1,200,000	1µ	The Intel486™ introduced the integrated floating-point unit. The generation of computers made possible allowed users to go from a text-based computer to one packed with click-computing.
1993	Intel® Pentium® processor	1993	66 MHz	3,100,000	0.8µ	The Intel® Pentium® processor, executing 112 million instructions per second, allowed computers to create easily-recognizable "real world" data, such as 3-D models, handwriting and photographic images.
1995	Intel® Pentium® Pro processor	1995	200 MHz	5,500,000	0.6µ	The Pentium® Pro processor delivered more performance than previous generation processors through an advanced, high-speed 32-bit architecture. This made possible the advanced 3-D visualization and interactive capabilities.
1997	Intel® Pentium® II processor / Intel® Pentium II Xeon® processor	1997	300 MHz	7,500,000	0.25µ	The Intel® Pentium® II processor's significant performance improvement over previous Intel architecture processors was based on its advanced multimedia capabilities, the Intel MMX™ technology and Intel 32-bit media enhancement technology.
1999	Intel® Pentium® III processor / Intel® Pentium® III Xeon® processor	1999	500 MHz	9,500,000	0.18µ	The Intel® Pentium® III processor executed Internet Streaming SIMD Extensions, extended the concept of processor speed to include the speed of delivering low-latency Internet response (latency during idle times).
2001	Intel® Pentium® 4 processor	2000 / 2001	1.5 GHz	42,000,000	0.18µ	The Intel® Pentium® 4 processor ushered in the advent of the network/internet age.
2002	Intel® Pentium® M processor	2002	1.7 GHz	55,000,000	90nm	The Intel® Pentium® M processor, the Intel® 855 chipset family, and the Intel® PRO/Wireless 2100 network connection provided the foundation for Intel's mobile processor technology. Intel® Centrino® processor technology was designed specifically for portable computing.
2002	Intel® Itanium® 2 processor	2002	1 GHz	220,000,000	0.13µ	The Intel® Itanium® 2 processor is the successor to the first Itanium processor. The architecture is based on Explicitly Parallel Instruction Computing (EPIC). The Intel® Itanium® 2 is capable of performing roughly eight times more work per clock cycle than other CISC and RISC architectures.
2003	Intel® Pentium® D processor	2005	3.2 GHz	291,000,000	65nm	The Intel® Pentium® D processor features the first desktop dual-core design with two complete processor cores, that each run at the same speed, in one physical package.
2006	Intel® Core™ 2 Duo processor / Intel® Core™2 Extreme processor / Intel® Pentium® processor	2006	2.93 GHz	291,000,000	65nm	Intel® Core™ 2 Duo processor optimizes mobile microarchitecture of the Intel® Pentium® M processor and enhances it with Intel® Advanced Digital Media Boost technology. Intel® Centrino® Pro quad-level office® processor technology provide no-compromise performance for the Intel® Core™ 2 Duo processor.
2006	Dual-Core Intel® Itanium® 2 processor 9000 series	2006	1.66 GHz	1,720,000,000	90nm	Dual-Core Intel® Itanium® 2 processor 9000 series supplanted the earlier, single-core version of the Itanium 2 processors. With more than 1.7 billion transistors, it is the most complex microprocessor, dissipates the least amount of power, Itanium processors while reducing average power consumption.
2007	Quad-Core Intel® Xeon® processor / Quad-Core Intel® Xeon® 5 processor / Intel® Core™ 2 Quad processor	2007	2.66 GHz	582,000,000	65nm	The unprecedented performance of the Intel® Core™ 2 Quad processor is made possible by two of the four complete execution cores delivering 2 times the performance of a dual-core processor. The Quad-Core Intel® Xeon® processor delivers 50 percent greater performance than Intel dual-core Xeon processors, and 2 times the performance of same-power servers. The quad-core based servers enable more applications to run with a minimal footprint.
2007	Quad-Core Intel® Xeon® processor (Penryn) / Quad-Core Intel® Xeon® processor (Penryn) / Quad-Core Intel® Core™ 2 Extreme processor (Penryn) / Intel® Core™ 2 Quad processor	2007	> 3 GHz	820,000,000	45nm	Intel's next generation Intel® Core™ 2 processor family, codenamed "Penryn", contains industry-leading enhancements to Intel's 45nm hi-k metal gate silicon technology for improved video, imaging, and SSE content performance and new power management features that further extend Intel's industry-leadership in performance and energy-efficiency.