Evoluzione ‘dettaglio minimo’ nei MOS integrati (~ lunghezza canale)

10 µm – 1971

6 µm – 1974

3 µm – 1977

1.5 µm – 1982

1 µm – 1985

800 nm – 1989

600 nm – 1994

350 nm – 1995

250 nm – 1997

180 nm – 1999

130 nm – 2001

90 nm – 2004

65 nm – 2006

45 nm – 2008

32 nm – 2010

22 nm – 2012

14 nm – 2014

10 nm – 2017

7 nm – *~2018*

5 nm – *~2021*

Evoluzione dei microprocessori (da Wikipedia)

Processor	Transistor count	Date of introduction	Designer	Process	Area
Intel 4004	2,300	1971	Intel	10,000 nm	12 mm²
Intel 8008	3,500	1972	Intel	10,000 nm	14 mm²
TMS 1000	8,000	1974[3]	Texas Instruments	8,000 nm	11 mm²
RCA 1802	5,000	1974	RCA	5,000 nm	27 mm²
Motorola 6800	4,100	1974	Motorola	6,000 nm	16 mm²
Intel 8080	4,500	1974	Intel	6,000 nm	20 mm²
MOS Technology 6502	3,510[4]	1975	MOS Technology	8,000 nm	21 mm²
Zilog Z80	8,500	1976	Zilog	4,000 nm	18 mm²
Intel 8085	6,500	1976	Intel	3,000 nm	20 mm²
Motorola 6809	9,000	1978	Motorola	5,000 nm	21 mm²
Intel 8086	29,000	1978	Intel	3,000 nm	33 mm²
Motorola 68000	68,000	1979	Motorola	3,500 nm	44 mm²
Intel 8088	29,000	1979	Intel	3,000 nm	33 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
WDC 65C02	11,500[5]	1981	WDC	3,000 nm	6 mm²
Intel 80286	134,000	1982	Intel	1,500 nm	49 mm²
Intel 80186	55,000	1982	Intel	3,000 nm	60 mm²
WDC 65C816	22,000[6]	1983	WDC	3000 nm[7]	9 mm²
Motorola 68020	190,000[8]	1984	Motorola	2,000 nm	85 mm²
Novix NC4016	16,000[9]	1985[10]	Harris Corporation	3,000 nm[11]	
Intel 80386	275,000	1985	Intel	1,500 nm	104 mm²
ARM 1	25,000[8]	1985	Acorn	3,000 nm	50 mm²
ARM 2	30,000[8]	1986	Acorn	2,000 nm	30 mm²
TI Explorer's 32-bit Lisp machine chip	553,000[12]	1987	Texas Instruments	2,000 nm[13]	
Motorola 68030	273,000	1987	Motorola	800 nm	102 mm²
Intel i960	250,000[15]	1988	Intel	600 nm	
DEC WRL MultiTitan	180,000[14]	1988	DEC WRL	1,500 nm	61 mm²
Intel 80486	1,180,235	1989	Intel	1000 nm	173 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
ARM 3	310,000	1989	Acorn	1,500 nm	87 mm²
68040	1,200,000	1990	Motorola	650 nm	152 mm²
R4000	1,350,000	1991	MIPS	1,000 nm	213 mm²
ARM 6	35,000	1991	ARM	800 nm	
Pentium	3,100,000	1993	Intel	800 nm	294 mm²
ARM700	578,977[16]	1994	ARM		68.51 mm²
68060	2,500,000	1994	Motorola	600 nm	218 mm²
SA-110	2,500,000[8]	1995	Acorn/DEC/Apple	350 nm	50 mm²
Pentium Pro	5,500,000[17]	1995	Intel	500 nm	307 mm²
AMD K5	4,300,000	1996	AMD	500 nm	251 mm²
Pentium II Klamath	7,500,000	1997	Intel	350 nm	195 mm²
AMD K6	8,800,000	1997	AMD	350 nm	162 mm²
Pentium II Deschutes	7,500,000	1998	Intel	250 nm	113 mm²
Pentium III Katmai	9,500,000	1999	Intel	250 nm	128 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
Pentium II Mobile Dixon	27,400,000	1999	Intel	180 nm	180 mm²
ARM 9TDMI	111,000[8]	1999	Acorn	350 nm	4.8 mm²
AMD K7	22,000,000	1999	AMD	250 nm	184 mm²
AMD K6-III	21,300,000	1999	AMD	250 nm	118 mm²
Pentium III Coppermine	21,000,000	2000	Intel	180 nm	80 mm²
Pentium 4 Willamette	42,000,000	2000	Intel	180 nm	217 mm²
Pentium III Tualatin	45,000,000	2001	Intel	130 nm	81 mm²
Pentium 4 Northwood	55,000,000	2002	Intel	130 nm	145 mm²
Itanium 2 McKinley	220,000,000	2002	Intel	180 nm	421 mm²
Itanium 2 Madison 6M	410,000,000	2003	Intel	130 nm	374 mm²
Barton	54,300,000	2003	AMD	130 nm	101 mm²
AMD K8	105,900,000	2003	AMD	130 nm	193 mm²
Pentium 4 Prescott	112,000,000	2004	Intel	90 nm	110 mm²
Itanium 2 with 9 MB cache	592,000,000	2004	Intel	130 nm	432 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
Pentium D Smithfield	228,000,000	2005	Intel	90 nm	206 mm²
Pentium 4 Prescott-2M	169,000,000	2005	Intel	90 nm	143 mm²
Pentium D Presler	362,000,000	2006	Intel	65 nm	162 mm²
Pentium 4 Cedar Mill	184,000,000	2006	Intel	65 nm	90 mm²
Dual-core Itanium 2	1,700,000,000[25]	2006	Intel	90 nm	596 mm²
Core 2 Duo Conroe	291,000,000	2006	Intel	65 nm	143 mm²
Cell	241,000,000	2006	Sony/IBM/Toshiba	90 nm	221 mm²
POWER6	789,000,000	2007	IBM	65 nm	341 mm²
Core 2 Duo Wolfdale	411,000,000	2007	Intel	45 nm	107 mm²
Core 2 Duo Allendale	169,000,000	2007	Intel	65 nm	111 mm²
ARM Cortex-A9	26,000,000[20]	2007	ARM	45 nm	31 mm²
AMD K10 quad-core 2M L3	463,000,000[19]	2007	AMD	65 nm	283 mm²
Six-core Xeon 7400	1,900,000,000	2008	Intel	45 nm	503 mm²
Core i7 (Quad)	731,000,000	2008	Intel	45 nm	263 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
Core 2 Duo Wolfdale 3M	230,000,000	2008	Intel	45 nm	83 mm²
Atom	47,000,000	2008	Intel	45 nm	24 mm²
AMD K10 quad-core 6M L3	758,000,000[19]	2008	AMD	45 nm	258 mm²
Six-core Opteron 2400	904,000,000	2009	AMD	45 nm	346 mm²
Six-core Core i7 (Gulftown)	1,170,000,000	2010	Intel	32 nm	240 mm²
Quad-core z196[23]	1,400,000,000	2010	IBM	45 nm	512 mm²
Quad-core Itanium Tukwila	2,000,000,000[27]	2010	Intel	65 nm	699 mm²
8-core Xeon Nehalem-EX	2,300,000,000[29]	2010	Intel	45 nm	684 mm²
8-core POWER7 32M L3	1,200,000,000	2010	IBM	45 nm	567 mm²
16-core SPARC T3	1,000,000,000[21]	2010	Sun/Oracle	40 nm	377 mm²
Six-core Core i7/8-core Xeon E5 (Sandy Bridge-E/EP)	2,270,000,000[28]	2011	Intel	32 nm	434 mm²
Quad-core + GPU Core i7	1,160,000,000	2011	Intel	32 nm	216 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
10-core Xeon Westmere-EX	2,600,000,000	2011	Intel	32 nm	512 mm²
Six-core zEC12	2,750,000,000	2012	IBM	32 nm	597 mm²
Quad-core + GPU Core i7 Ivy Bridge	1,400,000,000	2012	Intel	22 nm	160 mm²
Quad-core + GPU AMD Trinity	1,303,000,000	2012	AMD	32 nm	246 mm²
Atom "Medfield"	432,000,000[18]	2012	Intel	32 nm	64 mm²
8-core POWER7+ 80 MB L3 cache	2,100,000,000	2012	IBM	32 nm	567 mm²
8-core Itanium Poulson	3,100,000,000	2012	Intel	32 nm	544 mm²
8-core AMD Bulldozer	1,200,000,000[22]	2012	AMD	32 nm	315 mm²
61-core Xeon Phi	5,000,000,000[38]	2012	Intel	22 nm	720 mm²
Xbox One main SoC	5,000,000,000	2013	Microsoft/AMD	28 nm	363 mm²
Six-core Core i7 Ivy Bridge E	1,860,000,000	2013	Intel	22 nm	256 mm²
Apple A7 (dual-core ARM64 "mobile SoC")	1,000,000,000	2013	Apple	28 nm	102 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
12-core POWER8	4,200,000,000	2013	IBM	22 nm	650 mm²
Quad-core + GPU Core i7 Haswell	1,400,000,000[24]	2014	Intel	22 nm	177 mm²
Apple A8X (tri-core ARM64 "mobile SoC")	3,000,000,000[31]	2014	Apple	20 nm	128 mm²
Apple A8 (dual-core ARM64 "mobile SoC")	2,000,000,000	2014	Apple	20 nm	89 mm²
8-core Core i7 Haswell-E	2,600,000,000[30]	2014	Intel	22 nm	355 mm²
18-core Xeon Haswell-E5	5,560,000,000[39]	2014	Intel	22 nm	661 mm²
15-core Xeon Ivy Bridge-EX	4,310,000,000[36]	2014	Intel	22 nm	541 mm²
Quad-core + GPU GT2 Core i7 Skylake K	1,750,000,000	2015	Intel	14 nm	122 mm²
IBM z13 Storage Controller	7,100,000,000	2015	IBM	22 nm	678 mm²
IBM z13	3,990,000,000	2015	IBM	22 nm	678 mm²
Dual-core + GPU Iris Core i7 Broadwell-U	1,900,000,000[26]	2015	Intel	14 nm	133 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
32-core SPARC M7	10,000,000,000[42]	2015	Oracle	20 nm	
Qualcomm Snapdragon 835 (octa-core ARM64 "mobile SoC")	3,000,000,000[32][33]	2016	Qualcomm	10 nm	
Apple A10 Fusion (quad-core ARM64 "mobile SoC")	3,300,000,000	2016	Apple	16 nm	125 mm²
72-core Xeon Phi	8,000,000,000	2016	Intel	14 nm	683 mm²
22-core Xeon Broadwell-E5	7,200,000,000[41]	2016	Intel	14 nm	456 mm²
10-core Core i7 Broadwell-E	3,200,000,000[34]	2016	Intel	14 nm	246 mm²[35]
Xbox One X (Project Scorpio) main SoC	7,000,000,000[40]	2017	Microsoft/AMD	16 nm	360 mm²[40]
POWER9	8,000,000,000	2017	IBM	14 nm	695 mm²
IBM z14 Storage Controller	9,700,000,000	2017	IBM	14 nm	696 mm²
IBM z14	6,100,000,000	2017	IBM	14 nm	696 mm²
Centriq 2400	18,000,000,000[43]	2017	Qualcomm	10 nm	398 mm²

Processor	Transistor count	Date of introduction	Designer	Process	Area
Apple A11 Bionic (hexa-core ARM64 "mobile SoC")	4,300,000,000	2017	Apple	10 nm	89 mm²
8-core Ryzen	4,800,000,000[37]	2017	AMD	14 nm	192 mm²
32-core AMD Epyc	19,200,000,000	2017	AMD	14 nm	768 mm² (4 x 192 mm²)

Se il vostro laptop vi sembra misero…(da Wikipedia)

Apollo 11 Guidance Computer

The AGC was designed at the MIT Instrumentation Laboratory under Charles Stark Draper, with hardware design led by Eldon C. Hall. Early architectural work came from J.H. Laning Jr., Albert Hopkins, Richard Battin, Ramon Alonso, and Hugh Blair-Smith. The flight hardware was fabricated by Raytheon, whose Herb Thaler was also on the architectural team.

The Apollo flight computer was the first computer to use integrated circuits (ICs). While the Block I version used 4,100 ICs, each containing a single three-input NOR gate, the later Block II version (used in the crewed flights) used 2,800 ICs, each with dual three-input NOR gates. The ICs, from Fairchild Semiconductor, were implemented using resistor–transistor logic (RTL) in a flat-pack. They were connected via wire wrap, and the wiring was then embedded in cast epoxyplastic. The use of a single type of IC (the dual NOR3) throughout the AGC avoided problems that plagued another early IC computer design, the Minuteman II guidance computer, which used a mix of diode–transistor logic and diode logic gates.

The computer had 2048 words of erasable magnetic-core memory and 36 kilowords of read-only core rope memory. Both had cycle times of 11.72 microseconds. The memory word length was 16 bits: 15 bits of data and one odd-parity bit. The CPU-internal 16-bit word format was 14 bits of data, one overflow bit, and one sign bit (ones' complement representation).

Listing del software di navigazione scritto da Maggie Hamilton e altre/i (Assembler)