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x86

x86 is a family of instruction set architectures[a] initially developed by Intel based on the Intel 8086 microprocessor and its 8088 variant. The 8086 was introduced in 1978 as a fully 16-bit extension of Intel's 8-bit 8080 microprocessor, with memory segmentation as a solution for addressing more memory than can be covered by a plain 16-bit address. The term "x86" came into being because the names of several successors to Intel's 8086 processor end in "86", including the 80186, 80286, 80386 and 80486 processors.

Many additions and extensions have been added to the x86 instruction set over the years, almost consistently with full backward compatibility.[b] The architecture has been implemented in processors from Intel, Cyrix, AMD, VIA Technologies and many other companies; there are also open implementations, such as the Zet SoC platform (currently inactive).[2] Nevertheless, of those, only Intel, AMD, VIA Technologies, and DM&P Electronics hold x86 architectural licenses, and from these, only the first two are actively producing modern 64-bit designs.

The term is not synonymous with IBM PC compatibility, as this implies a multitude of other computer hardware; embedded systems, and general-purpose computers, used x86 chips before the PC-compatible market started,[c] some of them before the IBM PC (1981) debut.

As of 2021, most desktop computers, laptops and game consoles (with the exception of the Nintendo Switch[3][4]) sold are based on the x86 architecture, while mobile categories such as smartphones or tablets are dominated by ARM; at the high end, x86 continues to dominate compute-intensive workstation and cloud computing segments,[5] while the fastest supercomputer is ARM-based, and the top 4 are no longer x86-based. [3]

x86	
Designer	Intel, AMD
Bits	16-bit, 32-bit and 64-bit
Introduced	1978 (16-bit), 1985 (32-bit), 2003 (64-bit)
Design	CISC
Type	Register–memory
Encoding	Variable (1 to 15 bytes)
Branching	Condition code
Endianness	Little
Page size	8086–i286: None i386, i486: 4 KB pages P5 Pentium: added 4 MB pages (Legacy PAE: 4 KB→2 MB) x86-64: added 1 GB pages
Extensions	x87, IA-32, x86-64, MMX, 3DNow!, SSE, MCA, ACPI, SSE2, NX bit, SMT, SSE3, SSSE3, SSE4, SSE4.2, AES-NI, CLMUL, RDRAND, SHA, MPX, SME, SGX, XOP, F16C, ADX, BMI, FMA, AVX, AVX2, AVX-VNNI, AVX512, VT-x, VT-d, AMD-V, AMD-Vi, TSX, ASF, TXT

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See also

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References

Further reading

External links

Open	Partly. For some advanced features, x86 may require license from Intel; x86-64 may require an additional license from AMD. The 80486 processor has been on the market for more than 30 years[1] and so cannot be subject to patent claims. The pre-586 subset of the x86 architecture is therefore fully open.
Registers	
General purpose	▪ 16-bit: 6 semi-dedicated registers, BP and SP are not general-purpose ▪ 32-bit: 8 GPRs, including EBP and ESP ▪ 64-bit: 16 GPRs, including RBP and RSP
Floating point	▪ 16-bit: optional separate x87 FPU ▪ 32-bit: optional separate or integrated x87 FPU, integrated SSE units in later processors ▪ 64-bit: integrated x87 and SSE2 units, later implementations extended to AVX2 and AVX512