

INTEL Architectures

Intel has been at the forefront of the microprocessor technology and is a leading innovator in CISC architecture based processors. Almost 80% of the laptop computers and desktop computers use Intel microprocessors and thus is the market leader in microprocessors. As a policy they have adopted Moore's law applied to silicon technology which states that the number of transistors that can be placed inexpensively on a chip doubles every two years. Intel has based all research and development goals on such a policy. This can be seen by the release of new architectures every alternate year and up gradation of the processor to new silicon technology every alternate year. The x86 family of microprocessors has the same basic architecture as the Intel 8086 microprocessor released in 1978. This started off as a 16-bit processor.

The IA-32 architecture was released in 1985. The Intel 80386 was the first 32-bit processor with this architecture. It had the same architecture as that for 8086 except that all the registers and bus were 32-bits wide. It used segmented memory, allocating different parts of the program to different segments. The x86 architecture has not changed over the years and Intel ensures longevity of each processor by ensuring complete backward compatibility. The x86-32 can address memory space upto a maximum of 4GB. At a 33 MHz CPU clock 80386 was able to give 11.4 MIPS.

80386, 486, Pentium, Pentium Pro, Pentium II, Pentium III, Pentium 4, Pentium M, Core, Celeron M, Celeron D, A100 are the processors produced by Intel with the x86 32 bit architecture. The x86-64 or Intel64 was the next architecture, a 64-bit processor. Further developments of micro-architectures using the Intel 64 were NetBurst microarchitecture, Core microarchitecture, Atom microarchitecture, Nehalem microarchitecture. All these processors have now been discontinued.

The current processor architecture of Intel is called the Westmere microarchitecture. It is the 32nm version of the Nehalem microarchitecture and is based on the Intel64 architecture.

Some features of the 64-bit Intel architecture

- 64-bit flat virtual address space
- 64-bit pointers
- 64-bit wide general purpose registers
- 64-bit integer support
- Allows addressing of up to 2^{64} bytes of memory or 16 EB (Exabyte) of RAM.

References:

Developer's manual for IA-32 and Intel64: <http://developer.intel.com/Assets/PDF/manual/253665.pdf>

Information on IA-32: <http://en.wikipedia.org/wiki/IA-32>

Information on IA-64: <http://en.wikipedia.org/wiki/IA-32#IA-64>