Very-Large-Scale Integration (Vlsi) Encyclopedia Article

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Very-Large-Scale Integration (Vlsi)

Very-large-scale integration, or VLSI for short, is a term related to integrated circuits. Integrated circuits are chips, such as the **Intel** Pentium chip, which reside inside a computer and function in the performance of the computer. A silicon chip consists of transistors, electrical gates that amplify an electrical signal and allow the current to flow. The transistors power the performance of other components of the chip, such as logic elements (also called **memory** cells). VLSI refers to an **integrated circuit** composed of hundreds of thousands of these memory cells

The first practical chip was made in 1959 by two companies, Fairchild and **Texas Instruments**. As with many technologies, advancements after this initial achievement produced products of improved performance and construction. In 1971, Intel was successful in combining logic elements, which formally were housed in several different chips, into a single chip. Subsequently, chips became smaller, faster, and less expensive over time. Engineers learned how to pack more and more logic elements into a single circuit. This effort gave rise to VLSI, where millions of transistors are packed onto a circuit.

VLSI technology has made today's portable and high-performance computers possible. Spin-off technologies directly attributable to VLSI include the Global Positioning System, which required a processor capable of performing billions of calculations per second. Commercial collaborations between companies engaged in VLSI research and network providers have produced home networks that are extremely fast and capable of many simultaneous functions.

Further developments are on the horizon. Within the next decade, a central feature controlling the size of integrated circuitry--metal-oxide **semiconductor** field-effect **transistor channel** length--will shrink into the range of 50 nanometers, a measurement less than 200 atoms in length. Such minuscule chips, on which will reside the entire operating information for a computer, will enable computer size to shrink. The manual dexterity and operating comfort of the user may well be the limiting factor determining how small computers become. And, for computers that operate within human input, molecular dimensions are conceivable.