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*—Robert L. Glass*

## Address Resolution Protocol

See ARP.

## Adobe Systems

Adobe Systems, Inc. is a California-based developer of desktop publishing and computer graphics software. Formed in 1982 by John Warnock (1940– ) and Charles Geschke (1939– ), the company now employs around 2700 people worldwide and has annual revenues of around U.S.$1 billion.

Adobe's initial success was based on PostScript, a programming language for computer printers that could reproduce pages exactly as they appeared on the computer screen. PostScript was one of the cornerstones of the desktop publishing revolution. Although first used in **Apple Computer**'s LaserWriter printer in 1985, it was widely licensed to other companies.

Adobe and Apple were successful partners, but their relationship was harmed in the late 1980s when sworn enemies Apple and **Microsoft** teamed up to produce a rival to PostScript, which was already a de facto standard. To counter the threat, Adobe released some of PostScript's fonts as an open standard (so developers could use them without paying Adobe royalties). Later, it developed software designed so that Apple users no longer needed to buy the expensive LaserWriter printer, causing Adobe's own stock to drop by 30 percent.

Adobe's future seemed far from assured, but the company strengthened its position by developing other products for both print and electronic publishing. These include the Illustrator drawing package launched in 1987, an electronic publishing package called Acrobat released in 1993; PageMaker desktop publishing software acquired from Aldus in 1994; an advanced word processor called FrameMaker, acquired when Adobe bought Frame Technology in 1995; and an image-editing suite called Photoshop, now used by more than 90 percent of Web developers. In 1994, Adobe announced the formation of venture capital offshoot Adobe Ventures L.P. to make strategic investments for the future.

But by 1998, that future again seemed in doubt. High expenses and poor sales in Asia caused Adobe's stock price to plummet from a previous high of around U.S.$50 per share to just U.S.$24. This prompted a much-smaller rival, Quark Inc. (manufacturer of leading desktop publishing software Quark XPress), to attempt a hostile takeover in August 1998, which ultimately failed. Within months, Adobe had recovered its fighting spirit, restructured itself, and launched new products, including a replacement for the aging PageMaker software called InDesign. Still run by its founders Warnock and Geschke, Adobe has reaffirmed its mission to dominate the market for text and graphics authoring software.

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*—Chris Woodford*

## Advanced Micro Devices

Advanced Micro Devices (AMD) is a California-based supplier of integrated circuits for computers. AMD is well known as a producer of Intel-compatible **microprocessors**.

Another company spawned by the grandmother of **Silicon Valley, Fairchild Semiconductor,** AMD produces functional copies of electronic products that are better than the original. It was this concept that led Jerry Sanders (1937– ) to resign in 1969 from his post as director of worldwide marketing at Fairchild to cofound a new semiconductor company. During the first years of its existence, AMD served as a second source for products designed by other companies. This is a common scheme among semiconductor companies, since buyers do not want to depend on a single producer, and cross-licensing of patents is widespread in the industry. By 1974, after only five years in existence, AMD had reached U.S.$26.5 million in revenues.

During the 1970s, AMD grew steadily. It entered the memory and microprocessor businesses with great success. Its partnership with **Intel** goes back to a cross-licensing agreement signed in 1976 and the production of Intel's 8080 chip, the first in the line of microprocessors that would lead to the IBM PC–compatible computers.

The 1980s were a period of transition for AMD. The memory market came to be dominated by Japanese companies, which were able to offer lower prices; the market share of U.S. manufacturers fell steadily, until no important global players remained. AMD oriented its product line toward higher-revenue products, such as top-of-the-line microprocessors. In 1986, the 32-bit Am29300 processor was introduced and AMD continued producing **clones** of the Intel chips. AMD was, in fact, so successful that Intel tried to stop production, which led to a court battle and a five-year arbitration period that ended in 1992. AMD was then given full rights to produce Intel-compatible processors.

To compete, Intel changed its strategy in the mid-1990s when releasing its latest processor: instead of just giving the processor a number, as in the past, Intel called it **Pentium**, a name that could be protected like a brand. AMD countered by introducing the K5, later the K6 (1997), and the Athlon (1999). AMD processors have been beating Intel in terms of performance and chip price, as shown with the Athlon, the first x86 processor to reach the 750-MHz clock rate level at its introduction. AMD has also tried to distinguish itself from Intel by providing in its processors additional instructions for graphic-intensive multimedia applications.

In 1998, AMD had more than 13,000 employees worldwide and a revenue of U.S.$2.5 billion. AMD also sells microprocessors, networking chips, Ethernet controllers, nonvolatile memories, and other types of semiconductors.

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*—Raúl Rojas*

## Agent

Any system that is capable of perceiving events in its environment, of representing information about the environment state, and of acting guided by its perceptions and stored information is called an *agent.* If the environment is physical, we deal either with natural agents such as human beings, or with artificial agents such as robots. If the environment is virtual, such as the Internet, we deal with software agents. A *software agent* is a computer program that can accept tasks from its human user, can deduce which actions to perform in order to solve them, and act without user supervision.

Typical examples of software agents are Web-shopping assistants and lifelike characters (artificial creatures) in computer games. It is expected that software agents capable of helping their users to cope with the increasing complexities caused by the accelerating and virtually uncontrolled growth of the World Wide Web will play a major role in the future.

The term *agent* is sometimes used interchangeably with *intelligent system.* But, in general, agents do not have to be intelligent. In software engineering, for instance, the ability of an agent to communicate and cooperate with other systems in a flexible manner, and the ability of a *mobile agent* to migrate to another computer providing more resources via suitable net-