Shareware

Shareware is **software** that customers are allowed to try before purchasing. Unlike public domain software, shareware is commercial, proprietary software, with the authors or their representing interests retaining copyright privileges. Typically, a functional copy of the software is distributed at zero or low cost. After obtaining and evaluating the software, the user must register the software with the controlling party and pay whatever fee is specified.

The terms of evaluation vary in stringency. Some shareware authors rely on the honor system, asking that users register, but not attempting to enforce it. Other authors encourage purchases by either restricting the functionality of the unregistered software or by offering perks for registration. For example, most shareware packages use some form of a "nag screen," reminding users that they must register the software if they decide they want it. Users who register these packages usually get a version of the software without the nag screen. Other common restrictions include disabling parts of a software's functionality, or disabling it altogether after a certain amount of time has passed. Common perks include support and notices of future versions.

The concept of shareware was first formalized by Andrew Fluegelman, who, in 1982, wrote a communications program for the **personal computers** (PCs) called PC-Talk. Inspired by public radio, Fluegelman distributed the program freely over various bulletin board sites and asked users to pay U.S.$25 if they liked the program. Fluegelman dubbed this marketing model *freeware* and trademarked the term. Around the same time, other programmers, notably Jim Knopf, author of PC-File, and Bob Wallace, author of PC-Write, started distributing their own software under similar terms. To avoid the hassles of using the trademarked Freeware, many authors decided to adopt the term *shareware*, which Wallace had been using for his own software.

While the term *freeware* eventually became the de facto term for software that cost nothing to use, the requirements of shareware became more specific. Whereas Fluegelman merely encouraged his users to pay, the definition of shareware evolved so that users were required to pay. In April 1987, several shareware authors formed the Association of Shareware Professionals (ASP) to help its members create and market shareware. Although **encryption** and the **Internet** have made other distribution schemes feasible, shareware continues to be a popular way to market software.

FURTHER READING

Biondo, Jay. *A Walk on the Shareware Side: A Complete Reference About Shareware on the Internet.* Irving-Cloud Publishing Company, 1997.

—*Eugene Eric Kim*

Shell

Traditionally, the command line **interface** to the **operating system** (OS) of a computer is called its shell. It is the module of the OS that prompts the user and executes user commands. Some authors also talk of menu-driven shells, but this connotation of the term is not very common.

Operating systems of the past did not clearly separate the user interface from the rest of the system. The **Unix** operating system adopted such a clear-cut distinction that the user can even select between different types of shells for the same system. The most popular shells for Unix are the Bourne shell, the C-shell, and the Korn shell. The commands that the user types in each shell are transformed into system calls to the *kernel*, or central part, of the operating system. One attractive feature of Unix shells is that they are programmable—that is, a sequence of commands can be written in a file that is executed later. The file is called a *shell script.* In this way, the user can extend the set of commands of the operating system without much effort.

In Unix, a new shell can be started on top of another. The *Bourne shell*, the oldest of all, is started with the command "sh," for example. It prompts the user with a dollar symbol. The *C-shell*, written at the University of California–Berkeley, has a different prompt and more features. A shell can be used to define environment variables that alter the way that programs run, or to define the directory paths. The kind of terminal being

used, for example, can be encoded in an environment variable so that the OS knows how to display information on the screen or teletype.

With the advent of the **Internet**, in which commands and password travel through public channels, a way of protecting information is needed. The *secure shell* (ssh) for short is a shell augmented with cryptographic options that allows a user to log into another computer through a network. In secure mode, ssh encodes the traffic using IDEA (International Data Encryption Algorithm), an **algorithm** developed in Zurich at the ETH (Eidgenossiche Technische Hochschule; Swiss Federal Institute of Technology). After having opened a session with a remote host, ssh sends traffic via an encrypted session. An attacker who has managed to take over a network can only force ssh to disconnect, but cannot alter the traffic.

Some authors argue that the concept of a shell goes back to the operating system **Multics**, operational in 1965 at the Massachusetts Institute of Technology. Multics later influenced the designers of Unix. In Multics, the command interpreter launched programs not by starting a new process (as in Unix) but by linking the code of the program to the running code of the OS. The shell became a way to communicate with the new program and encapsulate it.

FURTHER READING

Anderson, Gail. *The Unix C Shell Field Guide*. Upper Saddle River, N.J.: Prentice Hall, 1986.

Carasik, Anne. *Unix Secure Shell*. New York: McGraw-Hill, 1999.

Kernighan, Brian W., and Robert Pike. *The Unix Programming Environment*. Upper Saddle River, N.J.: Prentice Hall, 1983.

—*Raúl Rojas*

Shockley, William

See Bardeen, John, Walter Brattain, and William Shockley.

Siemens

Siemens is a major manufacturer of **personal computers** (PCs) and is Germany's largest electronics supplier. It is named after the Siemens family, who controlled its predecessor companies from their beginnings in 1847 to the incorporation of the modern Siemens AG in 1966.

The founding father of the business is generally regarded to be Ernest Werner von Siemens (1816–92), an electrical engineer who in 1847 founded a telegraph construction firm called Telegraphen-Bau-Anstalt von Siemens & Halske. His partner, Johann George Halske (1840–90), withdrew 20 years later, leaving full control of the company to Werner and his three younger brothers: Karl Wilhelm (1823–83), Carl, and August Friedrich. Karl Wilhelm later emigrated to England, where he became Sir Charles William Siemens, head of the company's British subsidiary. The unit of conductance, the *mho*, is often called the *siemens* in honor of the brothers' contributions to electrical energy.

Siemens & Halske began to construct telegraph cables across Germany and then internationally, establishing offices in St. Petersburg in 1855 and London in 1857. The latter built long-distance cables throughout the British Empire and in 1875 opened the first direct cable connecting Britain to the United States. The company also expanded into other types of electrical engineering in Germany and elsewhere, including power generation and railways.

By the early twentieth century, the Siemens & Halske conglomerate was spinning off many of its operations into new companies. In 1903, *Siemens-Schuckertwerke GmbH* was born from the merger of Siemens's power-engineering interests with another firm, *Shuckert and Co.* In 1932, the medical equipment arm combined with the company *Reiniger Gebbert & Schall* to form *Siemens-Reiniger-Werke AG*. The three companies and their foreign subsidiaries were collectively known as the *House of Siemens*.

Siemens has been widely criticized for its activities during the Nazi era (1933–45), when it used slave labor and was involved in construction of the Auschwitz death camp. Its head, Hermann von Siemens (1885–1986), was interned on war crimes charges from 1946 through 1948. Siemens has paid out more compensation to former slaves than have most other equally culpable German corporations, although survivors still say that it has never formally apologized or admitted responsibility.