structured programming, a programming technique that emphasized top-down program design, first formalized in the late 1960s and embodied in languages such as **Pascal** and C.

Alan C. Kay (1940–) formalized the principles of object-oriented programming and coined much of the terminology when he began developing the **Smalltalk** language in 1971. Kay was inspired by his experiences with other computer languages, especially SIMULA and **LISP**, and by his academic background in biology. Objects communicate entirely by sending messages to each other, just as biological cells communicate with chemical messages. In addition to embodying many of the principles of object-oriented programming, Smalltalk was used for the development of a **graphical user interface for the Alto computer**, pioneering the concepts found in today's object-oriented frameworks for graphical user interfaces.

A number of programming languages today are object oriented, and many of the older programming languages have been extended to support object-oriented programming. Notable examples of the latter include **Ada**, LISP (CLOS, the Common Lisp Object System), and C (Objective-C and C++). Other object-oriented programming languages of note are **Java**, **Eiffel**, and Python.

The principles behind object-oriented programming have been further abstracted to address software design and analysis. This has led to further advances in the field of software engineering, from constructs for specifying object-oriented design, such as the Unified Modeling Language (UML), to the cataloging of recurring patterns in object-oriented software construction, known as *design patterns*.

FURTHER READING

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—*Eugene Eric Kim*

OCR See Optical Character Recognition.

OEM

The term OEM, an acronym for *original equipment manufacturer,* is a misnomer, since an OEM buys components from another company in bulk, assembles a device, and sells the product under its own company name and brand. **Siemens**, for example, sells **Fujitsu hardware** repackaged as Siemens equipment. The deal is convenient for both partners: The Japanese company gains access to a market dominated by German corporations and Siemens can save development costs. In this example, Siemens acts as the OEM.

OEMs are sometimes confused with VARs (value-added resellers). A VAR assembles a system with components from various manufacturers but usually includes extra **software** or functionality in the finished product. A company that assembles workstations for graphic designers and includes its own software in the package, is a VAR. If the only service provided by the company in this example is putting the components together, it is sometimes called a *systems integrator.*

—*Raúl Rojas*

Olivetti

Olivetti is an Italy-based company with more than 132,000 employees worldwide. Italy's largest telecommunications group, Olivetti introduced some of the first European commercial computers. Until 1997 Olivetti was also one of the main producers of **personal computers** (PCs) in Europe.

Olivetti was founded in 1908 by Camillo Olivetti (1868–1943) and was the first Italian typewriter company. Its history resembles somewhat **IBM**'s own shift from the office market to the computer industry. From being a typewriter business directed by Adriano Olivetti (1901–60), who was appointed director general in 1933, after World War II Olivetti moved swiftly into the electronic sector and in 1959 introduced Italy's first electronic computer, the Elea 9003 (Elaboratore Elettronico Automatico). The Elea