

History of Software and Computer System Design

The first modern computer came into existence in the 1940s. No single person is accredited with inventing the computer—the credit goes to the many inventors who have worked on different pieces of the computer over different time periods. Man's quest to simplify mathematical computations has led to extensive research, algorithm development, and many innovations. The modern-day laptops, tablets, ultra-books, smartphones, and many other devices are a result of these innovations. Let us overview the history of software and computer system design.

What Is a Computer?

A computer is an electronic device that stores and processes data. It comprises both hardware and software. The term *hardware* refers to the physical aspects of the computer and comprises the following main components:

1. central processing unit (CPU);
2. memory;
3. storage devices (disks, CDs, and tapes);
4. input and output devices (monitors, keyboards, mice, and printers).

All these components are connected to each other through the system bus. Please see figure 1 to get a visual overview of the main parts of the computer.

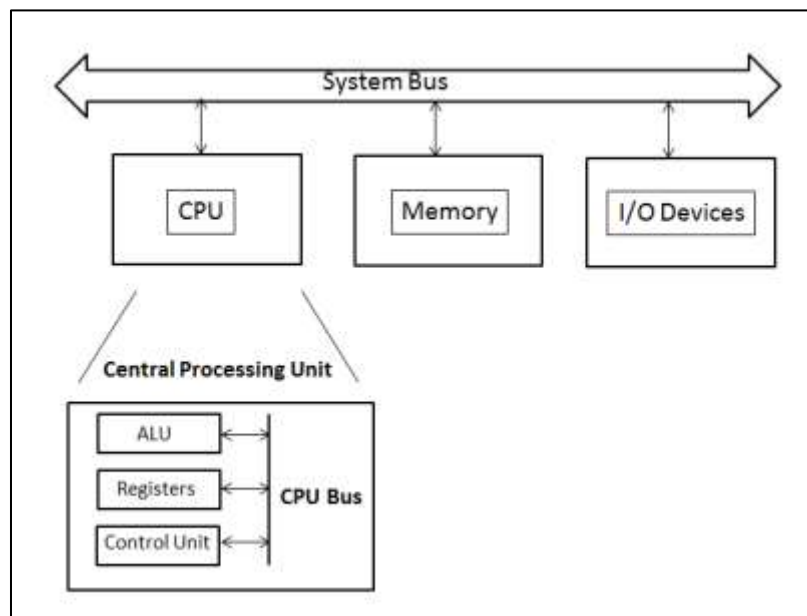


Figure 1. Main components of a computer.

Computer programs are written by programmers, and they guide the computer through an orderly set of actions to perform some operation. The term *software* refers to these programs that instruct hardware to perform specific tasks. The instructions to the

computer can be given using different programming languages. These languages have evolved over time.

History of Computing

The earliest device to keep track of calculations was an abacus. It was used around 50 BC and was very popular in Asia. A popular form of abacus is shown below.



Figure 2. Abacus. Terms of Use: The image above is in the public domain. The original can be found [here](#).

John Napier, a Scottish mathematician, physicist, astronomer, and astrologer defined natural logarithms in 1614 to simplify calculations. The use of logarithms greatly simplified complex astronomical, navigational, mathematical and scientific calculations at that time. He also invented Napier's Bones, a mathematical tool using a set of numbered rods that simplified multiplication.

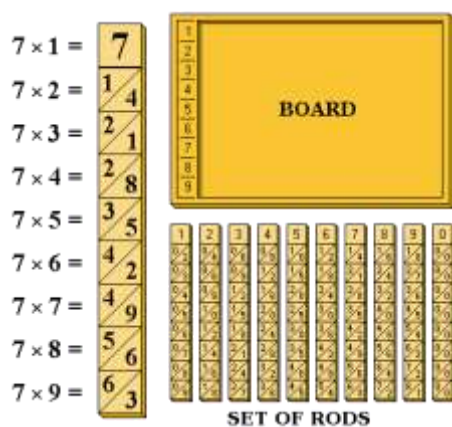


Figure 3. Napier's Bones. Terms of Use: The image above is licensed under the [Creative Commons Attribution-Share Alike 3.0 Unported](#) license and is attributed to Wikipedia user La Enciclopedia Libre Universal en Español. The original can be found [here](#).

Another device called a punch card was used in the late 1800s to keep track of data that could be read by machines. Punch cards stored information in digital format, which was represented by the presence or absence of holes in paper.

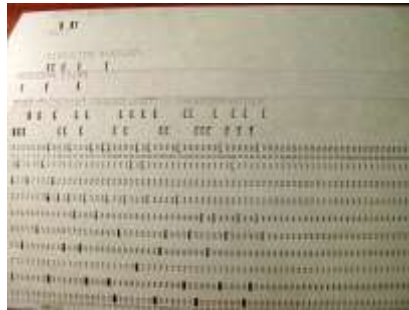


Figure 4. A punch card programmed with Fortran. Terms of Use: The image above is in the public domain. The original can be found [here](#).

Charles Babbage, a British mathematician and inventor, was the first person who proposed the idea of a programmable computer. While studying some complex astronomical calculations done by hand, he found numerous mistakes, which motivated him to design a “mechanical computer” that could do these calculations without errors. Though he designed such a machine, it was never built during his lifetime.

The first computer, ENIAC (Electronic Numerical Integrator and Computer) was built by the United States Army's Ballistic Research Laboratory in 1946. It was part of research aimed at providing better ballistic missiles to the U.S. Army during World War II.



Figure 5. ENIAC, the first computer. Terms of Use: The image above is in the public domain. The original can be found [here](#).

Dr. Presper Eckert and Dr. John Mauchly, two members of the team that built ENIAC, started their own company, Universal Automatic Computer, or UNIVAC, to build the first commercial computer. Their first client was the United States Census Bureau, which needed a computer to keep track of the growing U.S. population. The computer was successfully built in 1951 at the astonishing cost of about one million dollars.

Programming Languages

As computers started entering the academic and corporate worlds in late 1950s, many programming languages were also developed. Some of the popular languages of that time were FORTRAN (Formula Translation, by IBM) and COBOL (Common Business-Oriented Language, for business applications). FORTRAN and COBOL are high-level programming languages that make writing programs easier (as compared to writing programs in machine language, which uses 0s and 1s). Since computers could understand only machine language, intermediate programs called compilers and interpreters were written to translate programs written in FORTRAN and COBOL into machine language.

Richie and Kernighan developed the C programming language at Bell Labs in the early 1970s. C became one of the most popular programming languages ever. Many modern programming languages, such as C++, Java, Perl, Python, PHP, and several others have their roots in C.

In the late 1970s, a new design approach called object-oriented programming (OOP) was developed. This programming technique has several advantages, and almost all languages today follow this approach. In this course we are using a popular object-oriented language, Java, to learn computational skills.

Modern Personal Computers (PCs)

After extensive use of computers in the academic and corporate fields, PCs entered American households in the 1980s. Microsoft made a fortune by developing the Windows operating system and software for word processing, spreadsheets, and presentations, and integrating them into PCs.

The popularity of the Internet in the 1990s led to further innovations, and design improvements in computer chips or microprocessors led to PCs becoming more powerful and cheaper.

Modern Devices

With the advent of tablets, smartphones, and other mobile devices, several new languages are being used. Objective C is used by Apple to design applications that run on iPhones and iPads. For smartphones that run on the Android operating system, Java is the language used for developing applications.

Sources

http://www.randomhistory.com/2008/06/26_software.html

<http://www.eolss.net/Sample-Chapters/C15/E6-45-12.pdf>

<http://inventors.about.com/od/uvstartinventions/a/UNIVAC.htm>

<http://www.saylor.org/courses/cs101/#1.1.1>

<http://wikipedia.com>

<http://wikimedia.com>

<http://www.saylor.org/courses/cs101/#1.1.1>

The Saylor Foundation



Saylor.org
Page 5 of 5