知识长廊英语系列注释读本①

English Note Readings Series
for Knowledge Gallery

人脑的延伸
——现代计算机技术及应用

盛 之 伍毅强 杨俊敏 编著

中南工业大学出版社

人脑的延伸
——现代计算机技术及应用

盛　之　伍毅强　杨俊敏　编著

责任编辑　彭亚非

*

中南工业大学出版社出版发行

中南工业大学金湘印刷厂印装

新华书店总店北京发行所经销

*

开本：787×1092　1/32　印张：7.75　字数：162千字

1999年11月第1版　2000年2月第1次印刷

印数：0001—4000

*

ISBN 7-81061-251-4/G·047

定价：10.00元

Table of Contents

1. Development Stages of Computers

简介：当今计算机的发展日新月异，但是其历史可以追溯到5000年以前，它经历了一个漫长的历史发展阶段。本章主要介绍计算机早期的发展历史以及后来五个主要的发展阶段。

Overview[1]

Nothing epitomizes modern life better than the computer[2]. For better or worse[3], computers have infiltrated every aspect of our society[4]. Today computers do much more than simply compute[5]: supermarket scanners[6] calculate our grocery bill[7] while keeping store inventory[8]; computerized telephone switching centers play traffic cop to millions of calls and keep lines of communication untangled[9]; and automatic teller machines (ATM)[10] let us conduct banking transactions from virtually anywhere in the world. But where did all this technology come from and where is it heading? To fully understand and appreciate the impact computers have on[11] our lives

Notes:

[1]overview：概述。

[2]epitomize：概括。

[3]for better or worse：不管是好是坏。

[4]infiltrate：渗透。

[5]今天计算机的作用不仅仅局限于计算。

[6]super-market scanner：超市控制仪。

[7] bill：账单。

[8]记录库存量。inventory：库存单。

[9]程控电话交换中心扮演着城市交通警察的作用，处理数百万个电话呼叫，并且使通信线路畅通无阻。cop：警察。

[10] ATM = Automatic Teller Machine：自动取款机。

[11]have impact on：对…产生作用或者影响。

and promises they hold for the future[12], it is important to understand their evolution.

[12] promises they hold for the future 它们发展的前景。

Early Computing Machines and Inventors

The abacus[13], which emerged about 5000 years ago in Asia Minor[14] and is still in use today, may be considered the first computer. This device allows users to make computations using a system of sliding beads arranged on a rack[15]. Early merchants used the abacus to keep trading transactions[16]. But as the use of paper and pencil spread, particularly in Europe, the abacus lost its importance. It took nearly 12 centuries, however, for the next significant advance in computing devices to emerge[17]. In 1642, Blaise Pascal (1623～1662), the 18-year-old son of a French tax collector, invented what he called a numerical wheel calculator to help his father with his duties[18]. This brass rectangular[19] box, also called a Pascaline, used eight movable dials to add sums up[20] to eight figures long. Pascal's device used a base of ten to accomplish this. For example, as one dial moved

[13] abacus: 算盘。

[14] Asia Minor: 小亚细亚(亚洲西部一半岛，属土耳其)。

[15] sliding beads arranged on a rack 安装在算盘框架可以上下滑动的算盘珠。bead: 算盘珠。rack: 框架。

[16] keer trading transactions: 记录交易额。transaction: 交易。

[17] emerge: 出现。

[18] help sb with sth: 帮助某人做谋事。这句话的意思为，他发明了一种叫做数字轮的计算器来帮助他的父亲做事情。

[19] rectangular: 矩形的。

[20] add sth up. 加起来。

ten notches[21], or one complete revolution[22], it moved the next dial—which represented the ten's column—one place.

When the ten's dial moved one revolution, the dial representing the hundred's place moved one notch[23] and so on. The drawback[24] to the Pascaline, of course, was its limitation to addition[25].

In 1694, a German mathematician and philosopher, Gottfried Wilhem von Leibniz (1646～1716), improved the Pascaline by creating a machine that could also multiply[26]. Like its predecessor[27], Leibniz's mechanical multiplier was worked by a system of gears and dials[28]. Partly by studying Pascal's original notes and drawings, Leibniz was able to refine his machine[29]. The centerpiece of the machine was its stepped-drum gear design[30], which offered an elongated version[31] of the simple flat gear. It wasn't until 1820, however, that mechanical calculators gained widespread use. Charles Xavier Thomas de Colmar, a Frenchman, invented a machine that could perform the four basic arithmetic functions[32]. Colmar's mechanical calcula-

[21] notch: 刻度。

[22] revolution: 一转或者一圈。

[23] 当十分度盘转一圈，代表一百的盘则挪动一个孔。

[24] drawback: 缺陷。

[25] 其缺陷就是对加法的限制。

[26] multiply: 进行乘法运算。

[27] predecessor: 前身，前辈。

[28] 由齿轮和度盘系统操作的乘法器。gear: 齿轮。dial: 度盘。

[29] 提高机器的性能。refine: 改进，精炼。

[30] 该机器的中心件为分级式转鼓齿轮设计。

[31] elongated: 狭长型的。

[32] 进行四则运算。arithmetic: 算术的。

tor, the arithmometer, presented a more practical approach to computing[33] because it could add, subtract, multiply and divide[34]. With its enhanced versatility[35], the arithometer was widely used up until the First World War. Although later inventors refined Colmar's calculator, together with fellow inventors Pascal and Leibniz, he helped define the age of mechanical computation.

The real beginnings of computers as we know them today, however, lay with an English mathematics professor, Charles Babbage[36](1791～1871). Frustrated[37]at the many errors he found while examining calculations for the Royal Astronomical Society[38], Babbage declared, "I wish to God these calculations had been performed by steam![39]" With those words, the automation of computers had begun. By 1812, Babbage noticed a natural harmony between machines and mathematics: machines were best at performing tasks repeatedly without mistake[40]; while mathematics, particularly the production of mathematic tables, often required the simple repetition of steps. The problem centered on applying the abili-

[33]四则计算机给计算提供了一个更为实用的方法。arithmometer: 四则计算机。

[34] add: 加; subtract: 减; multiply: 乘; divide: 除。

[35] versatility: 多功能性。

[36]我们今天所了解的计算机的初级阶段应该从英国的一位数学教授查尔斯·巴贝其那里算起。lie with: 在于。

[37]frustrated: 沮丧的。

[38]皇家天文学会 royal: 皇家的; astronomical: 天文学的。

[39]我希望上帝允许我们用蒸汽机来进行这些计算。

[40]机器最擅长的就是进行重复的工作而不出差错。repeatedly: 重复地。

ty of machines to the needs of mathematics[41]. Babbage's first attempt at solving this problem was in 1822 when he proposed a machine to perform differential equations[42], called a Difference Engine[43]. Powered by steam and large as a locomotive, the machine would have a stored program and could perform calculations and print the results automatically. After working on the Difference Engine for 10 years, Babbage was suddenly inspired[44] to begin work on the first general-purpose[45] computer, which he called the Analytical Engine[46]. Babbage's assistant, Augusta Ada King, Countess[47] of Lovelace (1815～1842) and daughter of English poet Lord Byron, was instrumental[48] in the machine's design. One of the few people who understood the Engine's design as well as Babbage, she helped revise plans, secure funding from the British government[49], and communicate[50] the specifics of the Analytical Engine to the public. Also, Lady Lovelace's fine understanding of the machine allowed her to create the instruction routines[51] to be fed into[52] the computer,

[41]问题集中在如何把机器的能力应用于数学家的需要。center on:集中在。apply to:应用于。

[42]differential equation:微分方程。

[43]差分机。

[44]be inspired:获得灵感。

[45]general-purpose:通用的。

[46]Analytical engine:分析机。

[47]伯爵夫人。

[48]be instrumental in:在某方面起作用。

[49]修改计划并从政府那里筹集基金。secure (from):从某处获得。

[50]communicate (to):传播。specifics:具体的细节。

[51]instruction routine:指令常规。

[52]feed (into):输入。

making her the first female computer programmer[53]. In the 1980's, the U.S. Defense Department named a programming language ADA in her honor[54].

Babbage's steam-powered Engine, although ultimately never constructed, may seem primitive by today's standards.[55] However, it outlined the basic elements of a modern general purpose computer[56] and was a breakthrough concept[57]. Consisting of[58] over 50 000 components, the basic design of the Analytical Engine included input devices in the form of perforated cards[59] containing operating instructions and a "store" for memory of 1000 numbers of up to[60] 50 decimal digits long. It also contained a "mill" with a control unit that allowed processing instructions in any sequence, and output devices to produce printed results[61]. Babbage borrowed the idea of punch cards to encode the machine's instructions from the Jacquard loom.[62] The loom, produced in 1820 and named after its inventor, Joseph-Marie Jacquard, used punched boards that controlled the patterns to be woven[63].

In 1889, an American inventor, Her-

[53]第一位女电脑程序员 programmer:编程员。

[54]In honor of sb.: 纪念某人。

[55]Babbage 的以蒸汽为动力的机器,虽然最终没有建成,但是按照今天的标准可能会显得非常的简陋。ultimately: 最终地。primitive:原始的,简陋的。

[56]但是它勾勒出现代通用计算机的基本组成部分。outline: 勾勒出轮廓。

[57]是一个突破性的概念。break-through: 突破。

[58]consist of: 由…组成。

[59]perforated Cards:穿孔卡。perforated: 穿孔的。

[60]up to:高达。

[61]output:输出。

[62]Encode:编码。

[63]该织布机,1820 年生产并以发明家的名字命名,用穿孔板来控制要编织的花纹。

man Hollerith (1860～1929), also applied the Jacquard loom concept to computing[64]. His first task was to find a faster way to compute the U. S. census[65]. The previous census in 1880 had taken nearly seven years to count and with an expanding population, the bureau feared it would take 10 years to count the latest census. Unlike Babbage's idea of using perforated cards to instruct the machine, Hollerith's method used cards to store data information[66] which he fed into a machine that compiled[67] the results mechanically. Each punch on a card represented one number, and combinations of two punches represented one letter. As many as[68] 80 variables[69] could be stored on a single card. Instead of ten years, census takers[70] compiled their results in just six weeks with Hollerith's machine.

In addition to[71] their speed, the punch cards served as a storage method for data[72] and they helped reduce[73] computational errors. Hollerith brought his punch card reader into the business world[74], founding[75] Tabulating Machine Company in 1896, later to become International Busi-

[64]把 JACQUARD 的织布机的概念应用到计算中。apply (to):应用。

[65]census:人口普查。

[66]store data information:储存数据信息。store:储存。

[67]compile:编译。

[68]as many as:多达。

[69]variable:变量。

[70]census taker:进行普查的工作人员。

[71]in addition to:除了。

[72]充当数据存储的方法。serve as:充当。

[73]reduce:减少。

[74]把穿孔卡读数器应用到商业世界中。bring (into):带入到。

[75]found:成立。

ness Machines (IBM) in 1924 after a series of mergers[76]. Other companies such as Remington Rand and Burroghs also manufactured punch readers for business use. Both business and government used punch cards for data processing[77] until the 1960's.

In the ensuing years[78], several engineers made other significant advances[79]. Vannevar Bush (1890～1974) developed a calculator for solving differential equations[80] in 1931. The machine could solve complex differential equations that had long left scientists and mathematicians baffled[81]. The machine was cumbersome[82] because hundreds of gears and shafts[83] were required to represent numbers and their various relationships to each other. To eliminate this bulkiness[84], John V. Atanasoff (b. 1903), a professor at Iowa State College (now called Iowa State University) and his graduate student, Clifford Berry, envisioned[85] an all-electronic computer that applied Boolean algebra to computer circuitry[86]. This approach was based on the mid-19th century work of George

[76]经过一系列兼并。merger:兼并。

[77]data processing:数据处理。

[78]ensuing:随后的。

[79]几个工程师获得其它有意义的进展。significant:有意义的。

[80]differential equation:微分方程。

[81]可以解决长时间使科学家们感到困惑的复杂微分方程。baffle:使人困惑。

[82]cumbersome:笨重。

[83]shaft:轴筒。

[84]eliminate:消除,排除。

[85]envision:预见。

[86]circuitry:电路。

Boole[87] (1815～1864) who clarified the binary system[88] of algebra, which stated that any mathematical equations could be stated simply as either true or false. By extending this concept to electronic circuits[89] in the form of on or off, Atanasoff and Berry had developed the first all-electronic computer by 1940. Their project, however, lost its funding and their work was overshadowed by similar developments by other scientists[90].

[87]这个方法建立在19世纪中叶乔治·布勒的工作基础上。base on: 建立在。

[88]binary system: 二进位制。

[89]extend (to): 把(某事)扩大到一定的范围。

[90]他们的项目没有得到资助,因为他们的工作被其他科学家类似的成果所遮盖。overshadow: 遮盖。

Five Generations of Modern Computers

First Generation (1945～1956)

With the onset of the Second World War[91], governments sought to develop computers to exploit their potential strategic importance[92]. This increased funding for computer development projects hastened technical progress[93]. By 1941 German engineer Konrad Zuse had developed a computer, the Z3, to design airplanes and missiles. The Allied forces, however, made greater strides in developing powerful computers[94]. In 1943, the British completed a

[91]onset: 开始。

[92]exploit: 挖掘。

[93]hasten: 加速。

[94]协约国的部队在开发高容量计算机方面迈出了很大的步伐。stride: 步伐。

secret code-breaking computer[95] called Colossus[96] to decode German messages[97]. The Colossus's impact on the development of the computer industry was rather limited for two important reasons. First, Colossus was not a general-purpose computer[98]; it was only designed to decode secret messages. Second, the existence of the machine was kept secret until decades after the war.

American efforts produced a broader achievement. Howard H. Aiken (1900～1973), a Harvard engineer working with IBM, succeeded in producing an all-electronic calculator[99] by 1944. The purpose of the computer was to create ballistic charts[100] for the U.S. Navy. It was about half as long as a football field[101] and contained about 500 miles of wiring. The Harvard—IBM Automatic Sequence Controlled Calculator, or Mark I for short[102], was an electronic relay computer. It used electromagnetic signals to move mechanical parts. The machine was slow (taking 3～5 seconds per calculation) and inflexible[103] (in that sequences of calculations could not

[95]英国制造出一台能够破译密码的计算机。code-breaking: 破译(密码)。

[96]巨人。

[97]破译德国密码。decode: 破译(密码)。

[98]general-purpose computer: 通用计算机。

[99]all-electronic calculator: 全电子计数器。

[100]ballistic charts: 弹道图。

[101]football field: 足球场。

[102]for short: 简称为。

[103]inflexible: 不灵活或者变通性差。

change[104]); but it could perform basic arithmetic as well as more complex equations.

Another computer development spurred[105] by the war was the Electronic Numerical Integrator and Computer (ENIAC), produced by a partnership[106] between the U. S. government and the University of Pennsylvania. Consisting of 18000 vacuum tubes, 70000 resistors and 5 million soldered joints[107], the computer was such a massive piece of machinery that it consumed[108] 160 kilowatts of electrical power, enough energy to dim the lights in an entire section of Philadelphia[109]. Developed by John Presper Eckert (1919～1995) and John W. Mauchly (1907～1980), ENIAC, unlike the Colossus and Mark I, was a general-purpose computer that computed at speeds 1000 times faster than Mark I.

In the mid-1940's John von Neumann (1903～1957) joined[110] the University of Pennsylvania team, initiating concepts in computer design that remained central to computer engineering for the next 40

[104]in that...: (为介词宾语从句) 意思为:计算机灵活性较差,主要表现为计算程序不能变动。

[105]spur: 受到(某事)的激励。

[106]由美国政府和宾西法尼亚州大学合伙生产的电子数字积分计算机。partnership:合伙。

[107]soldered joint: 焊接头。

[108]consume: 消耗。

[109]所消耗的能量足以使费城整个地区的电灯变暗。Dim: 使变暗。

[110]join: 加盟于。

years[111]. Von Neumann designed the Electronic Discrete Variable Automatic Computer[112] (EDVAC) in 1945 with a memory to hold both a stored program as well as data. This "stored memory" technique as well as the "conditional control transfer," that allowed the computer to be stopped at any point and then resumed[113], allowed for greater versatility in computer programming[114]. The key element to the von Neumann architecture[115] was the central processing unit[116], which allowed all computer functions to be coordinated[117] through a single source. In 1951, the UNIVAC I (Universal Automatic Computer), built by Remington Rand, became one of the first commercially available computers to take advantage of these advances. Both the U.S. Census Bureau and General Electric owned UNIVACs. One of UNIVAC's impressive early achievements was predicting the winner of the 1952 presidential election, Dwight D. Eisenhower.

[111]率先提出了对计算机工程今后40年的发展至关重要的新概念。initiate:倡议。

[112]电子离散变数自动计算机。

[113]使计算机可以在任何时候终止然后重新开始。resume:重新开始,恢复。

[114]给计算机编程提供了更大的适应性。versatility:多方面适应性。

[115]冯诺依曼体系结构的关键组成部分。architecture:体系结构。

[116] central processing unit(CPU):中心处理器。

[117]coordinate:协调。

First generation computers were characterized by[118] the fact that operating instructions were made-to-order[119] for the specific task for which the computer was to

[118] be characterized by:以(某事)为特点或者特征。

[119] made-to-order:特制的,定做的。

be used. Each computer had a different binary-coded program called a machine language that told it how to operate. This made the computer difficult to program and limited its versatility and speed. Other distinctive features of first generation computers were the use of vacuum tubes (responsible for their breathtaking size[120]) and magnetic drums[121] for data storage.

[120](电子管)是造成计算机尺寸巨大的主要原因。breathtaking: 令人吃惊的。

[121]magnetic drum: 磁鼓。

Second Generation Computers (1956~1963)

By 1948, the invention of the transistor greatly changed the computer's development. The transistor replaced the large, cumbersome vacuum tube in televisions, radios and computers. As a result, the size of electronic machinery has been shrinking[122] ever since. The transistor was at work[123] in the computer by 1956. Coupled with[124] early advances in magnetic-core memory[125], transistors led to[126] second generation computers that were smaller, faster, more reliable[127] and more energy-efficient[128] than their predecessors[129].

[122]shrink: 缩小。

[123]at work: 起作用。

[124]be coupled with: 伴随。

[125] magnetic-core memory: 磁芯存储器。

[126]lead to: 导致或者带来。

[127]reliable: 可靠的。

[128]energy-efficient: 节能。

[129]predecessor: 前身。

The first large-scale[130] machines to take advantage of this transistor technology were early supercomputers, Stretch by IBM

[130]large-scale: 大规模的或者大型的。