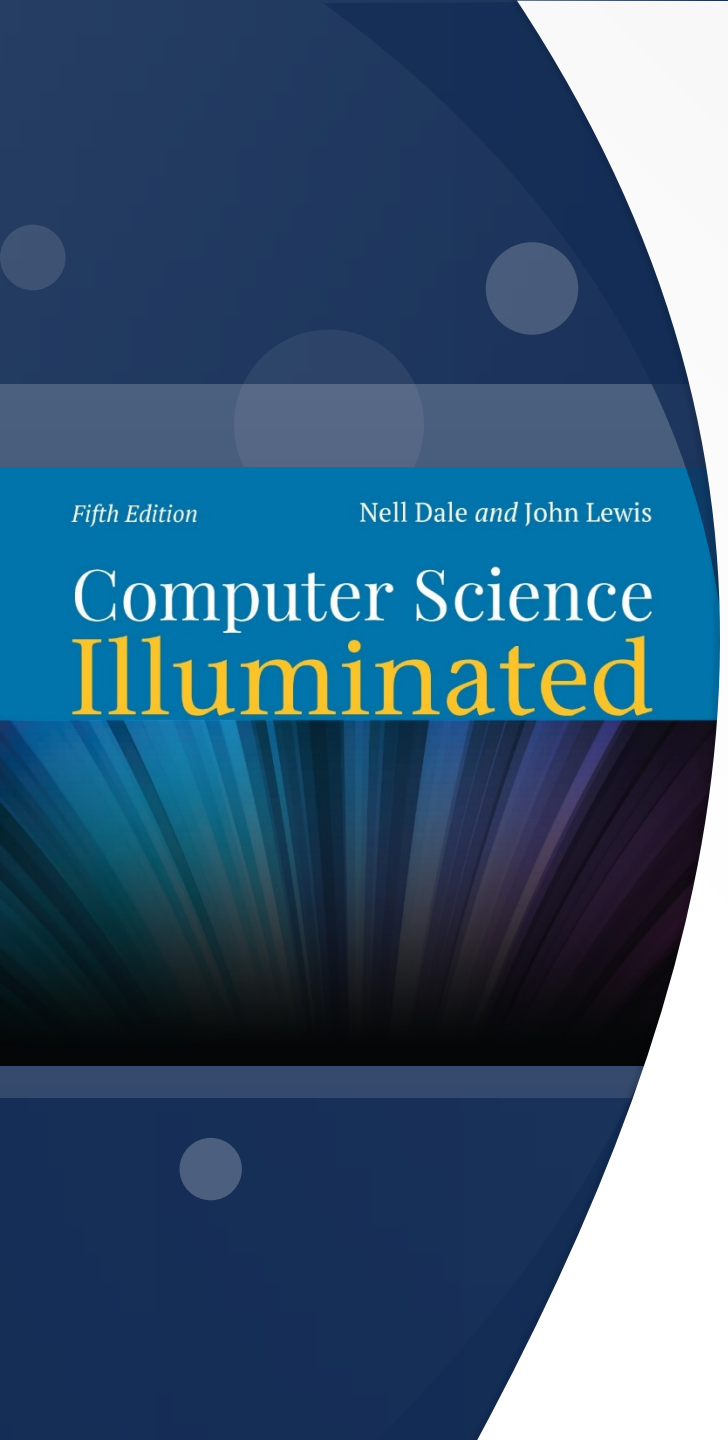
Fifth Edition

Nell Dale *and* John Lewis

Computer Science Illuminated

Introduction to Computer Science
计算机科学技术导论

Reference Solutions to Module 1
(单元模块1相关作业参考答案)



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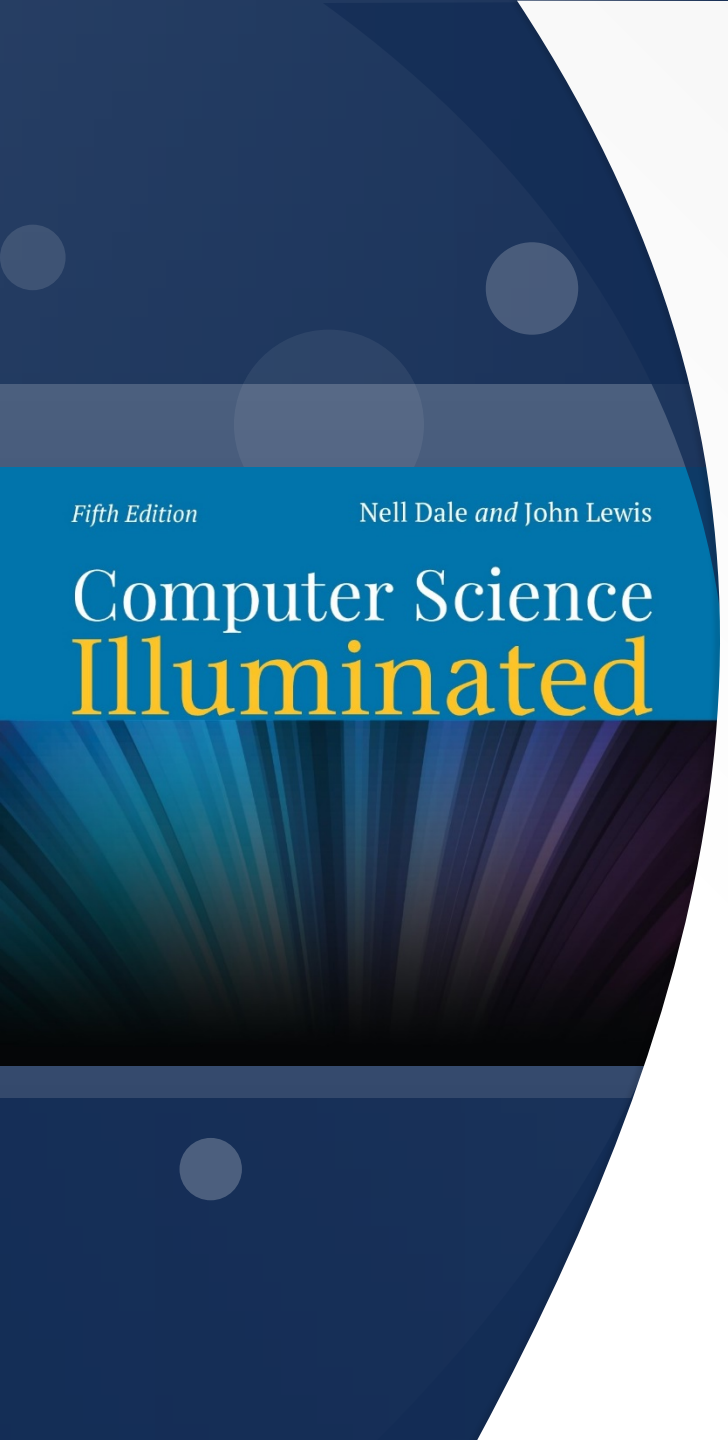
Homework 1 (Chapter 1 of the Textbook)

1. (Textbook) Exercises 1~10
2. (Textbook) Exercises 11~23
3. (Textbook) Exercises 24~38
4. (Textbook) Question 43

- Due date: October 8th, 2019
- A hard copy of your answers should be submitted right before our class starts



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Exercise 1

1. What French mathematician built and sold the first gear-driven mechanical machine that did addition and subtraction?

B. Pascal

(英文版课本第9页) In the middle of the seventeenth century, Blaise Pascal, a French mathematician, built and sold the first gear-driven mechanical machines, which performed whole-number addition and subtraction.

(中文版课本第6页) “17世纪中叶”句，注意该翻译遗漏了英文版中“the first”信息

Exercise 2

2. Who built the first mechanical machine that did addition, subtraction, multiplication, and division?

A. Leibniz

(英文版课本第9页) Later in the seventeenth century, a German mathematician, Gottfried Wilhelm von Leibniz, built the first mechanical device designed to do all four whole-number operations: addition, subtraction, multiplication, and division.

(中文版课本第6页) “17世纪末”句

Exercise 3

3. Who designed the first mechanical machine that included memory?

C. Babbage

(英文版课本第9页) It wasn't until the nineteenth century that the next major step was taken, this time by a British mathematician. Charles Babbage … Babbage's design was the first to include a memory so that intermediate values did not have to be reentered.

(中文版课本第7页) "计算硬件的下一步重大进展"句

Exercise 4

4. Who was considered the first programmer?

D. Lovelace

(英文版课本第10页) Ada Augusta, Countess of Lovelace, … is credited with being the first programmer.

(英文版课本第13页) Ada and Charles Babbage became lifelong friends. She worked with him, … In fact, Ada (Lovelace) today is recognized as the first computer programmer today.

(中文版课本第7页) “Ada以第一位程序设计员著称”句

(中文版课本第8页) “事实上，现在普遍认为Ada是历史上第一位计算机程序设计员”句

Exercise 5

5. Who proposed that a punched card be used for counting the census?

E. Hollerith

(英文版课本第10页) During the later part of the nineteenth century and the beginning of the twentieth century, … Dr. Herman Hollerith developed the first electro-mechanical tabulator, which read information from a punched card. His device revolutionized the census taken every ten years in the United States.

(中文版课本第7页) “Herman Hollerith博士发明了第一台机电式制表机，从穿孔卡片读取信息…人口普查”句

Exercise 6

6. Who edited Babbage's Work?

D. Lovelace

(英文版课本第10页) Ada Augusta, Countess of Lovelace, … became interested in Babbage's work … and extended his ideas (as well as correcting some of his errors).

(英文版课本第13页) In 1842, … Ada decided to translate the account into notes about the machine. In the end, her notes were twice as long as the original material.

(中文版课本第7页) "她对Babbage的分析机非常感兴趣"句

(中文版课本第11页) "Ada于27岁时决定把这份记录翻译成英文"句

Exercise 7

7. Who was Ada Lovelace's father?

F. Byron

(英文版课本第10页) Ada, the daughter of Lord Byron (the English poet), was a skilled mathematician.

(英文版课本第13页) On December 10, 1815, a daughter—Augusta Ada Byron, was born to Anna Isabella Byron and George Gordon, Lord Byron.

(中文版课本第7页) “Ada是英国诗人Lord Byron的女儿”句

(中文版课本第11页) “1815年12月10日…”句

Exercise 8

8. Who would have been mentioned in the book *the Code Breakers*?

G. Turing

(英文版课本第11页) A recent Broadway play deals with his life. Analysis of the capabilities of Turing machines is a part of the theoretical studies of all computer science students.

(中文版课本第7页) “最近有一部百老汇音乐剧演绎了他的一生”句

注: 本题的明确答案需要一些文化背景才能确定。Codebreaker是一部记述图灵一生的纪录片，The Imitation Game（模仿游戏）中图灵的主要任务，就是破译纳粹德国军队的加密通信。

Exercise 9

9. Who developed the concept of punched holes used in weaving cloth?

H. Jacquard

(英文版课本第9页) In the late eighteenth century, Joseph Jacquard …. Jacquard's loom, used for weaving cloth. The loom used a series of cards with holes punched in them to specify the use of specific colored thread and therefore dictate the design that was woven into the cloth.

(中文版课本第6页) “18世纪晚期”句

Exercise 10

10. Who is associated with IBM?

E. Hollerith

(英文版课本第9页) Hollerith later formed a company known today as IBM.

(中文版课本第7页) “后来, Hollerith博士创建了当今著名的IBM公司”句

Exercise 11

Match the hardware Listed to the appropriate generation.

11. Circuit boards

B. Second

(英文版课本第14页) In the second generation, transistors and other components for the computer were assembled by hand on printed circuit boards.

(中文版课本第9页) “在第二代计算机中…集成在印刷电路板上”句，注意虽然这句话在“第三代”的节段，陈述的确实第二代计算机硬件的组装方式，因此应该选B，课本所附带的标准答案是错误的。

Exercise 12

Match the hardware Listed to the appropriate generation.

12. Transistors

B. Second

(英文版课本第12页) The advent of the transistor (…) ushered in the second generation of commercial computers.

(中文版课本第9页) “晶体管（…）的出现标志着第二代商用计算机的诞生”句

Exercise 13

Match the hardware Listed to the appropriate generation.

13. Magnetic core memory

B. Second

(英文版课本第14页) The second generation also witnessed the advent of immediate-access memory… The second generation used memory made from magnetic cores, tiny doughnut-shaped devices, each capable of storing one bit of information.

(中文版课本第9页) “第二代计算机中还出现了即时存取存储器… 第二代计算机使用磁芯作为存储器，这是一种微小的环形设备，每个磁芯可以存储一位信息”句

Exercise 14

Match the hardware Listed to the appropriate generation.

14. Card input/output

A. First

(英文版课本第12页) The input device was a card reader that read the holes punched in an IBM card (the descendant of the Hollerith card). The output device was either a punched card or a line printer.

(中文版课本第9页) “输入设备是一台读卡机，可以阅读IBM卡… 输出设备是穿孔卡片或行式打印机”句

Exercise 15

Match the hardware Listed to the appropriate generation.

15. Parallel computing

D. Fourth

(英文版课本第页) Although computers that use a single primary processing unit continue to flourish, radically new machine architectures began appearing in the late 1980s. Computers that use these parallel architectures rely on a set of interconnected central processing units.

(中文版课本第7页) “20世纪80年代末，尽管… 使用并行体系结构的计算机依靠的是一套相互连接的中央处理器”句

Exercise 16

Match the hardware Listed to the appropriate generation.

16. Magnetic drum

A. First

(英文版课本第12页) The primary memory device of this first generation of computers was a magnetic drum that rotated under a read/write head. When the memory cell that was being accessed rotated under the read/write head, the data was written to or read from that place.

(中文版课本第9页) “第一代计算机的主存储器是在读/写头下旋转的磁铁。当…数据将被写入这个单元或从这个单元读出”句

Exercise 17

Match the hardware Listed to the appropriate generation.

17. Magnetic tape drives

A. First

(英文版课本第12页) By the end of this (first) generation, magnetic tape drives had been developed that were much fasters than card readers. Magnetic tape drives are sequential storage devices, meaning that the data on the tape must be accessed one after another in a linear fashion.

(中文版课本第9页) “在这一代将要结束时，出现了磁带驱动器…必须按照线性顺序访问磁带上的数据”句

Exercise 18

Match the hardware Listed to the appropriate generation.

18. Integrated circuits

C. Third

(英文版课本第14页) The third generation is characterized by integrated circuits (ICs), solid pieces of silicon that contained the transistors, other components and their connections.

(中文版课本第9~10页) “第三代计算机的特征是集成电路（IC）…以及它们的连线的硅片”句

Exercise 19

Match the hardware Listed to the appropriate generation.

19. Personal computer

D. Fourth

(英文版课本第15页) By the late 1970s, the phrase personal computer (PC) had entered the vocabulary. Microcomputers had become so cheap that almost anyone could have one, and a generation of kids grew up playing PacMam.

(中文版课本第10页) “20世纪70年代末，词汇表中出现个人计算机（PC）这个词。…也是玩吃豆人游戏长大的”句

Exercise 20

Match the hardware Listed to the appropriate generation.

20. Vacuum tube

A. First

(英文版课本第12页) Commercial computers in the first generation (from approximately 1951 to 1959) were built using vacuum tubes to store information..

(中文版课本第8页) “第一代商用计算机使用真空管存储信息”句

Exercise 21

Match the hardware Listed to the appropriate generation.

21. Large-scale integration

D. Fourth

(英文版课本第15页) Large-scale integration characterizes the fourth generation. From several thousand transistors on a silicon chip in the early 1970s, we had moved to a whole microcomputer on a chip by the middle of this decade.

(中文版课本第10页) “大规模集成化是第四代计算机的特征”句

Exercise 22

Match the hardware Listed to the appropriate generation.

22. Magnetic disk

B. Second

(英文版课本第14页) The magnetic disk, a new auxiliary storage device, was also developed during the second computer hardware generation. The magnetic disk is faster than the magnetic tape because each data item can be accessed directly by refereeing to its location on the disk.

(中文版课本第9页) “磁盘是一种新的辅助存储设备，也出现在第二代计算机硬件中”句

Exercise 23

Match the hardware Listed to the appropriate generation.

23. Networking

D. Fourth

(英文版课本第17页) In the 1980s, the concept of a large machine with many users gave way to a network of smaller machines connected so that they can share resources such as printers, software, and data.

(中文版课本第11页) “20世纪80年代，多用户大型机的概念被小型机器连接成的网络代替…”句

Exercise 24

Match the software or software concepts listed to the appropriate generation.

24. Assemblers

A. First

(英文版课本第18页) A program called an assembler reads each of the program's instructions in mnemonic form and translates it into the machine-language equivalent. (This sentence describes the assemblers developed in the first generation of computing software.)

(中文版课本第12页) “一种称为汇编器的程序读取每条用助记忆编码编写的程序指令…”句

Exercise 25

Match the software or software concepts listed to the appropriate generation.

25. FORTRAN

B. Second

(英文版课本第19页) Two of the languages developed during the second generation are still used today: FORTRAN (a language designed for numerical applications) and COBOL (a language designed for business applications).

(中文版课本第12页) “第二代软件时期开发的两种语言目前仍然在使用…”句

Exercise 26

Match the software or software concepts listed to the appropriate generation.

26. Operating Systems

C. Third

(英文版课本第20页) The introduction of computer terminals as input/output devices gave users ready access to computers, and advances in system software gave machines the ability to work much faster. … Controlling this process was an operating system that organized and scheduled the different jobs.

(中文版课本第13页) “用作输入/输出设备的计算机终端…”句

Exercise 27

Match the software or software concepts listed to the appropriate generation.

27. Structured programming

D. Fourth

(英文版课本第21页) The 1970s saw the introduction of better programming techniques called structured programming, a logical, disciplined approach to programming.

(中文版课本第14页) “20世纪70年代出现了更好的程序设计技术，即结构化程序设计方法…”句

Exercise 28

Match the software or software concepts listed to the appropriate generation.

28. Time sharing

C. Third

(英文版课本第20页) The problem was how to make better use of the machine's greater capabilities and speed. The solution was time sharing—many different users, each at a terminal, communicating (inputting and outputting) with a single computer all at the same time.

(中文版课本第13页) “这就导致了如何利用机器越来越多强大的能力和速度的问题…解决方法就是分时…”句

Exercise 29

Match the software or software concepts listed to the appropriate generation.

29. HTML (for the Web)

E. Fifth

(英文版课本第22页) In 1990, Tim Berners-Lee, a British researcher at the CERN physics lab in Geneva, Switzerland, created a set of technical rules for what he hoped would be a universal Internet document center called the World Wide Web. Along with these rules, he created HTML, a language for formatting documents, and a rudimentary, text-only browser, a program that allows a user to access information from websites worldwide.

(中文版课本第15页) “1990年，日内瓦的CERN物理实验室…只能显示文本”句

Exercise 30

Match the software or software concepts listed to the appropriate generation.

30. Loaders

B. Second

(英文版课本第20页) During the first two computer software generations, utility programs had been written to handle often-needed tasks. Loaders loaded programs into memory and linkers linked pieces of large programs together.

(中文版课本第13页) “在前两代软件时期，实用程序用于处理频繁执行的任务…装入器把程序载入内存…”句

注意：按课本描述其实无法判断第一代还是第二代。

Exercise 31

Match the software or software concepts listed to the appropriate generation.

31. Spreadsheets

D. Fourth

(英文版课本第21页) High-quality, reasonably priced applications software packages became available at neighborhood stores. … Three typical kinds of application packages are spreadsheets, word processors, and database management systems.

(中文版课本第14页) “即使在附近的小店，都可以买到高品质的、价格合理的应用软件程序包…电子制表软件、…”句

Exercise 32

Match the software or software concepts listed to the appropriate generation.

32. Word processors

D. Fourth

(英文版课本第21页) High-quality, reasonably priced applications software packages became available at neighborhood stores. … Three typical kinds of application packages are spreadsheets, word processors, and database management systems.

(中文版课本第14页) “即使在附近的小店，都可以买到高品质的、价格合理的应用软件程序包…文字处理软件和…”句

Exercise 33

Match the software or software concepts listed to the appropriate generation.

33. Lisp

B. Second

(英文版课本第19页) Another language that was designed during this period (second computer software generation) that remains in use today is Lisp. Lisp differs markedly from FORTRAN and COLBOL and was not widely accepted.

(中文版课本第13页) “这一时期设计的另一种语言是Lisp…”句

Exercise 34

Match the software or software concepts listed to the appropriate generation.

34. PC-DOS

D. Fourth

(英文版课本第21页) Better and more powerful operating systems were being developed, too. UNIX, developed at AT&T as a research tool, has become standard in many university settings. PC-DOS, developed for the IBM PC, and MS-DOS, developed for PC compatibles, became standards for personal computers.

(中文版课本第14页) “更好、更强大的操作系统…为IBM PC开发的PC-DOS系统…”句

Exercise 35

Match the software or software concepts listed to the appropriate generation.

35. Loaders/linkers bundled into an operating system

C. Third

(英文版课本第20页) In the third generation, these utility programs (loaders and linkers) were refined and put under the direction of the operating system. This group of utility programs, the operating system, and the language translators (assemblers and compilers) became known as systems software.

(中文版课本第13页) “第三代软件改进了这些实用程序，使它们处于操作系统的引导之下…”句

Exercise 36

Match the software or software concepts listed to the appropriate generation.

36. Java

E. Fifth

(英文版课本第22页) Object-oriented design became the design of choice for large programming projects. Whereas structured design is based on a hierarchy of tasks, object-oriented design is based on a hierarchy of data objects. Java, a language designed by Sun Microsystems for object-oriented programming, began to rival C++.

(中文版课本第14页) “面向对象的程序设计方法…Java语言成为C++语言的竞争对手”句

Exercise 37

Match the software or software concepts listed to the appropriate generation.

37. SPSS

C. Third

(英文版课本第20页) As part of the third generation, general-purpose application programs were being written. One example was the Statistical Package for the Social Science (SPSS), which was written in FORTRAN.

(中文版课本第13页) “在第三代软件中，出现了多用途的应用程序，用FORTRAN语言编写的…”句

Exercise 38

Match the software or software concepts listed to the appropriate generation.

38. C++

D. Fourth

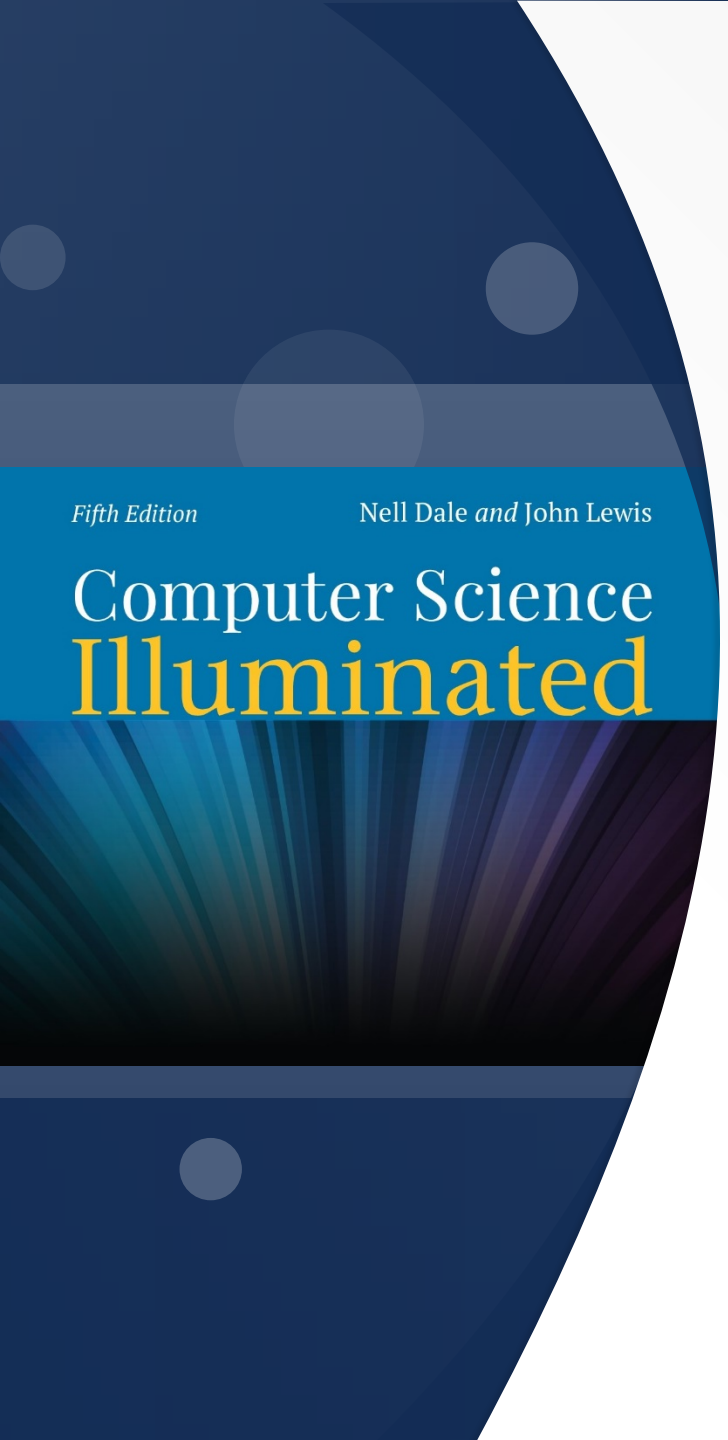
(英文版课本第21页) C, a language that allows the user to intersperse assembly-language statements in a high-level program, was also introduced. C++, a structured language that allows the user access to low-level statements as well, became the language of choice in industry.

(中文版课本第14页) “此外，还出现了C语言…C++也是一种允许用户使用低级语句的结构化语言…”句

Exercise 43

Of the predictions listed in this chapter on pages 23-24, which do you consider the biggest error in judgment? Explain.

本题为主观题，回答的切入角度、论据使用方式等，均由同学们自己决定，答案言之有理、表达清晰准确即可。



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Review Tips for the Final Exam

Module 1: The Big Picture

1) **Definition of computing system**
2) **Abstraction**
   - Special attention should be paid to differentiating abstraction from similar yet more specific notions such as information hiding, procedural abstraction, control abstraction, and encapsulation.
   - You may need to locate these similar concepts in other chapters of the textbook.
3) **History of computing**
   - Special attention should be paid to early history of computing hardware.

Fifth Edition

Nell Dale *and* John Lewis

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Please feel free to contact the instructor for further explanations on this homework assignment. Thanks!