

Programming Language

编程语言



内容提要



计算机英语教学PPT



■ Introduction

Programming languages are the artificial languages used to write a sequence of instructions (a computer program) that can be run by a computer. 编程语言是用于编写可由计算机运行的一系列指令（计算机程序）的人工语言。

■ Language Types

➤ programming languages 编程语言

- ✓ low-level language (or machine language): 低级编程语言（或机器语言）。可以被计算机直接理解。所有的可执行程序最终都是以机器语言的形式被计算机读入，但并非都是用机器语言编写的，直接用机器语言编程极端困难。
- ✓ high-level language: 高级语言。必须首先翻译成机器语言，计算机才能理解和处理。比汇编语言或机器语言更像人类语言，用于编写复杂的程序比较容易。
- ✓ assembly language: 汇编语言。是中间语言（intermediate language），非常接近机器语言，但仍然得翻译成机器语言。

■ Classification of High-Level Languages

- procedure-oriented language 面向过程语言, 亦称 procedural language (过程语言)
- functional language 函数式语言
- object-oriented language 面向对象语言
- logic language 逻辑语言

■ Language Structure and Components 语言结构与成分

- statement: 语句。表达一个简单想法的基本句子, 其目的是给计算机一条基本指令。
 - ✓ assignment statement 赋值语句
 - ✓ conditional statement 条件语句
 - ✓ procedure statement 过程语句
 - ✓ function statement 函数语句
- expression: 表达式。语句的一段, 用于描述对一些程序变量执行的一系列计算操作。
- data declaration: 数据声明。给变量赋予名称和属性的一种语句。
- variables and macro: 变量和宏 (宏指令)。属于编程语言的常见成分。

■ History

- first-generation languages: machine languages
- second-generation languages: assembly languages
- third-generation languages: high-level languages , 如 : COBOL, Fortran, Pascal, BASIC, C, C++, Objective-C, Swift, Java
- fourth-generation languages: high-level languages, 比第三代语言更像人类语言, 如: SQL, RPG
- fifth-generation languages: 一种观点 → Prolog 及其他的声明式语言 (declarative languages) ; 另一种观点 → 允许程序员使用图形工具或可视化工具而不是敲打一行行语句来构建程序的语言

语言点聚焦



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- Programming languages vary greatly in their sophistication and in their degree of versatility. 编程语言在复杂性和通用程度上差异很大。

sophistication: n. 复杂性; 尖端性

- the sophistication of modern machines 现代机器的复杂性 (先进性)
- the level of linguistic sophistication exhibited by other high-level languages (3A/II) 其他高级语言所表现出的语言复杂程度

versatility: n. 多用途; 通用性

- the versatility of plastics 塑料的广泛用途

- Although these languages were designed to address specific categories of computer problems, they are highly portable, meaning that they may be used to program many types of computers. 尽管这些语言旨在处理特定类型的计算机问题, 但它们具有很高的可移植性, 也就是说它们可以用来为多种类型的计算机编程。



- Machine languages differ depending on the manufacturer and model of computer. 机器语言视计算机制造商与型号不同而有所区别。

depending on: 视...而定, 取决于。depending on 属于短语介词, 用法类似于介词。

- with each execution yielding a potentially different result depending upon the options and data that the user gives the computer (4A/I) 取决于用户提供给计算机的选项和数据, 每次执行可能产生不同的结果
 - I tend to have a different answer, depending on the family. 我会根据家庭的不同而给予不同的答复。
- While all executable programs are eventually read by the computer in machine language, they are not all programmed in machine language. 尽管所有的可执行程序最终都是以机器语言的形式被计算机读入的, 但它们并非都是用机器语言编写的。

read: v. 【计算机】读, 读入, 读取

- to read a file into a computer 把文件读入计算机



- High-level languages are relatively sophisticated sets of statements utilizing words and syntax from human language. 高级语言是相对复杂的一系列语句，它们使用来自人类语言的词汇和句法。

sophisticated: a. 复杂的；尖端的，先进的

- sophisticated equipment 精密设备
- Honeybees use one of the most sophisticated communication systems of any insect. 蜜蜂之间所用的交流方式是昆虫中最为复杂的方式之一。

- However, high-level languages must be translated into machine language by another program called a compiler before a computer can understand them. 然而，高级语言必须由称为编译器的另外一种程序翻译成机器语言，计算机才能理解它们。 注意 before 的翻译方法：It was three days before he came back. 他3天后才回来；Put that away before it gets broken. 把它收好，免得砸碎了。要根据情况灵活翻译。



- An assembly language statement is composed with the aid of easy to remember commands. 汇编语言的语句是借助易于记忆的命令编写的。一般应写作 easy-to-remember commands, 再如 easy-to-use database (易用数据库)。
- it is possible to manipulate specific bits in both assembly and machine languages. 对特定的位进行操控, 用汇编语言和机器语言都是可行的。
manipulate: v. 操作; 操纵; 控制; 处理
 - Computers are very efficient at manipulating information. 计算机在处理信息方面效率极高。
 - As a politician, he knows how to manipulate public opinion. 作为一个政客, 他知道如何左右公众舆论。
- one or more related blocks of statements that perform some complete function are grouped together into a program module, or procedure 执行某个完整功能的一个或多个语句块组成一个程序模块或过程

- a simple statement can be used to refer back to the procedure. 可以使用一个简单的语句调回这个过程。refer to 有“提到”“查阅”“引用”等意思，再如：Refer back to the text notes on page 18. 回过来查阅18页上的课文注解。
- design each procedure to be general enough to be used in different situations 将每个过程都设计得足够通用，能用于不同的情况。
- Functional languages also allow variables—symbols for data that can be specified and changed by the user as the program is running—to be given values only once. 函数式语言也允许变量——在程序运行过程中可以被用户指定和更改的数据符号——只被赋值一次。
- Object-oriented languages are outgrowths of functional languages. 面向对象语言是函数式语言的发展结果。
outgrowth: n. 发展结果；产物
 - This theory was an outgrowth of Einstein's “unified field theory”. 这一理论是从爱因斯坦的“统一场论”发展而来的。

- ❑ Objects also have certain functions associated with them, called methods. 对象还有某些与其相关的功能, 称为方法。
- ❑ A logic program consists of sets of facts and if-then rules, which specify how one set of facts may be deduced from others... 逻辑程序由事实组和“如果—则”规则构成, “如果—则”规则具体说明一组事实如何可以从其他事实组中推断出来。

deduce: v. 推论, 推断

- an input statement can be logically deduced from other statements in the program
(3A/III) 一条输入语句可以按照逻辑从程序中的其他语句推断出来。
- Can we deduce from your silence that you do not approve? 你保持沉默, 我们是否可以据此而推断出你不赞成?

- The properties variables can have are called types, and they include such things as what possible values might be saved in the variables, how much numerical accuracy is to be used in the values, and how one variable may represent a collection of simpler values in an organized fashion, such as a table or array. 变量可以具有的属性称为类型，它们包括：变量中能保存哪些可能的值；这些值中使用何种程度的数值精度；以及一个变量可以如何以有组织结构的方式——如以表或数组的形式——表示一组比较简单的值。 本句虽然比较长，但结构很清楚：两个并列分句由 and 连接，第一个分句 The properties (variables can have) are called types 含有一个定语从句，第二个分句 they include such things as 后面给出了3个例子，作为并列成分，由 and 连接。

- An assignment statement assigns a variable a value derived from some expression, while conditional statements specify expressions to be tested and then used to select which other statements should be executed next. 赋值语句给一个变量赋予得自某个表达式的值, 而条件语句则指定要被测试、然后用于选择接下来应该执行的其他语句的表达式。
assigns a variable a value (derived from some expression): 给一个变量赋值, derived from some expression 为定语, 修饰value. assign 意为“赋值”“指定”“分配”等。
- These statements also define the kinds of variables and parameters the programmer can choose and the type of value that the code will return when an expression accesses the procedure or function. 这些语句也定义程序员可选的变量和参数种类, 以及表达式访问过程或函数时, 代码所返回的值的类型。 本句主干结构为 These statements also define the kinds of variables and parameters ... and the type of value ...。 the programmer can choose 和 that the code will return when an expression accesses the procedure or function 为定语从句, 分别修饰 the kinds of variables and parameters 和 the type of value。

- ❑ Macros translate segments of code that have been written in a language structure defined by the programmer into statements that the programming language understands. 宏将用程序员定义的语言结构编写的代码段翻译成编程语言可以理解的语句。
- ❑ Second-generation languages added a level of abstraction to machine languages by substituting abbreviated command words for the strings of 1s and 0s used in machine languages. 第二代语言用缩写的命令字代替了机器语言中使用的1与0字符串，从而给机器语言添加了一定的抽象度。

abbreviate: v. 缩写, 缩略, 缩简

- an abbreviated document without detailed proposals 一份略去详细建议的文件简本
- 'Information technology' is usually abbreviated to 'IT'. 'Information technology' 通常缩写为 'IT'。

substitute: v. 用...代替, 替代 (substitute A for B; substitute B with/by A)

- substitute honey for sugar 用蜂蜜代替食糖; Beckham was substituted in the second half after a knee injury. 下半场贝克汉姆膝盖受伤被换下。

- When high-level languages were originally conceived in the 1950s, they were dubbed third-generation languages because they seemed to be a major improvement over machine and assembly languages. 高级语言在20世纪50年代最初构思的时候, 被称为第三代语言, 因为这种语言似乎是对机器语言和汇编语言的重大改进。 improvement over 常做 improvement on, 如: The new electronic controls are a big improvement on the old system. 新的电子控制装置比旧系统有很大改进。

dub: v. 给...起绰号; 把...称为

➤ Mrs Thatcher was dubbed 'The Iron Lady'. 撒切尔夫人被称作“铁娘子”。

- C and C++ remain popular today for system and application software development—for example, to develop Microsoft Windows and Linux. C 和 C++ 今天在系统与应用软件开发上依然很流行——如用于开发 Microsoft Windows 和 Linux。 system and application software development 指“系统软件开发”和“应用软件开发”。

- Prolog and other declarative languages became closely identified with the fifth-generation project and were classified as fifth-generation languages. Prolog 以及其他的声明式语言与这个第五代项目密切联系起来，并被归类为第五代语言。

identify (with): v. 认为...等同于; 使与...有关联

- He identifies beauty with goodness. 他认为美即善。
 - She has always been identified with the radical left. 她总是被与激进左派联系在一起。
- define fifth-generation languages as those that allow programmers to use graphical or visual tools to construct programs rather than typing lines of statements 将第五代语言定义为允许程序员使用图形工具或可视化工具而不是敲打一行行语句来构建程序的语言。

知识扩展



结构复杂的句子和长句

多数中国学生都有体会，英语阅读的一大障碍是对结构复杂的句子和长句（即所谓难句）的理解。有时，句子里的单词都认识，但由于结构复杂了，句子长了，句子成分之间的关系就搞不清楚了，结果句子理解起来就很吃力或根本看不懂。而令中国学生头痛的是，无论简单句还是复合句，英语句子一般都比汉语的结构复杂、长度长，科技英语（包括计算机英语）尤其如此。科技英语要求表述客观、严谨、完整、详尽，因此往往把各种短语、从句通过形态变化、关系词、关系手段往主要成分、主句上挂，结果常常使习惯于汉语句法的中国学生感到句子长、结构复杂，无从下手。

实际上，只要我们了解了英语与汉语的句子结构特点，并在句子结构分析上有意识地多加练习、多总结经验与方法，完全可以闯过英语难句关。常给中国学生造成难句现象的句子类型或结构包括**定语从句**、**倒装句**、**分隔结构**、**省略**、**并列结构**、**同位语**、**分词作状语**、**it 的用法**、**长句**等。**否定句**、**比较结构**等也时常带来阅读理解困难。



一、定语从句

我们知道，**定语从句**有限定性与非限定性之分，**非限定性定语从句**通常用逗号与句子其他部分隔开。**限定性定语从句**的先行词（即修饰对象）一般为名词或代词，非限定性定语从句的先行词通常可以是名词，也可以是整个主句或主句的一部分。**先行词**是上下文中的哪个词，先行词是一个词还是整个主句或主句的一部分，时常成为阅读中一个难以把握的问题。在计算机英语阅读中，解决这个问题一要靠语法知识，二要靠上下文和逻辑判断，甚至还要靠专业知识。

语法规则在有些情况下可以帮助确定先行词。定语从句中谓语的数、定语从句中代词的性和数等都有助于判断先行词。

□ 例句1

Viruses can also reside on portions of the hard disk or floppy disk that load and run the operating system when the computer is started, and such viruses thereby are run automatically. 病毒还可以驻留在硬盘或软盘的特定部分，这些部分在计算机启动时装载和运行操作系统。因此，这种病毒自动运行。

句中 that 引导的定语从句虽然紧靠 the hard disk or floppy disk，但从其谓语 load and run 的数来判断，先行词应当是 portions，因为 or 连接的两个单数名词，其谓语动词必定为单数形式。

□ 例句2

At the simplest level, a LAN provides no more than a shared medium along with a set of rules that govern the access to that medium. 在最简单的层面上，局域网只是提供一种共享的介质，以及一套用来管理对该介质的访问的规则。

与例句1相反，that 引导的定语从句的先行词，根据从句中谓语的数，应该是从句紧靠的 rules。

□ 例句3

Instead, resources can be added to client machines, which is more cost-effective. 相反，资源可以添加到客户机上，这样更具有成本效益。

从意思上判断，定语从句的先行词可以是 client machines，也可以是 resources can be added to client machines。但从 is 来看，先行词只能是后者。

□ 例句4

The subject of computers, which also began its development at that time, began to grow and become a separate subject itself. 也是在那时开始兴起的计算机学科，发展成了一门独立的学科。

代词 its 说明，定语从句的先行词应为单数，所以先行词是 subject，而不是 computers。

有时，根据语法规则无法确定定语从句的先行词，这时有效的办法就是根据上下文从逻辑上判断，甚至要靠专业知识。

□ 例句5

American naval officer and mathematician Grace Murray Hopper in 1952 wrote the first program that turned English computer instructions into the strings of ones and zeros that make computers work.

1952年，美国海军军官、数学家格雷斯 默里 霍珀编写出第一个转化程序，将英文计算机指令转化为可使计算机工作的1和0字符串。

从语法上看，strings 和 ones and zeros 都可以是先行词，但从逻辑和专业知识上看，先行词应该是 strings，或者更确切地讲是 the strings of ones and zeros。使计算机工作的不是1和0，而是由1和0组成的字符串。

二、倒装句

倒装句由于不是正常语序，有时会使我们在阅读中感到困惑。一般来说，英语中有两种情况需要倒装：一是由于**语法结构的需要**而进行的倒装，二是由于**修辞的需要**而进行的倒装。在前一种情况，倒装是必须的，否则就会出现语法错误；在后一种情况，倒装是选择性的，倒装与否只会产生表达效果上的差异。英语的倒装可分为两种：一是**部分倒装**，只将谓语的一部分（通常是助动词或情态动词）置于主语之前；二是**全部倒装**，将整个谓语移至主语之前。

□ 例句1

Not only are auction sites automated; software tools for bidders are also hot. 不仅拍卖网站实现了自动化，而且供出价人使用的软件工具也很热门。

具有否定意义的词或短语位于句首时，要用**部分倒装**。含有 not only...but also 结构的句子，将 not only 放在句首时，即属于此种情况。这时，not only 所在的分句需要部分倒装。值得一提的是，not only...but also 可有 not only...but 或 not only...also 等变体形式。

□ 例句2

Coupled with the growing quantity of information is the development of technologies which enable the storage and delivery of more information with greater speed to more locations than has ever been possible before. 与日益增加的信息量相结合的是使以下情况得以实现的技术的发展，即与以往任何时候相比以更快的速度存储并传送更多的信息到更多的地点。

这个句子属于**全部倒装**，其主干是一个被动句，正常语序应为：The development of technologies ... is coupled with the growing quantity of information.。采取倒装语序的目的是避免头重脚轻，因为 technologies 后面跟了一个包含比较结构的定语从句修饰它，致使主句的主语部分比较长。

三、分隔结构

分隔结构指语法关系密切的两个句子成分被其他句子成分分隔开的现象。分隔结构的产生多是为了保持句子平衡、避免头重脚轻，或是为了语义严密、结构紧凑等。分隔结构常常让中国学生感到困惑，搞不清句子成分之间的关系。像判断定语从句的先行词一样，我们也可以从语法规则、逻辑关系等方面进行分析。

□ 例句1

E-mail provides a false sense of security, much like driving in a car. But in reality, those are real people on that information superhighway, and they have feelings. 与在车中驾驶很相像，电子邮件给人以虚假的安全感。但是，实际上，信息高速公路上的那些人都是真人，他们是有感情的。

句中的 those 与其定语（on that information superhighway）被谓语（系表结构）分隔开。如果把 on that information superhighway 作为 people 的定语，那么 those 是指哪些人则不好解释，因为上下文没有提到。

□ 例句2

In addition, software has been developed that can be taught to recognize an individual's handwriting.

另外，经过训练后能够识别一个人的手迹的软件也已经开发出来了。

在这句话中，主句的主语（software）与其定语从句被谓语（has been developed）分隔开。根据有二。其一，that 在其引导的宾语从句中不充当句子成分，在其引导的定语从句中充当句子成分，而句中的 that 充当从句的主语。其二，software has been developed 是被动句，software 既是主句的主语也是 develop 的逻辑宾语，that 引导的从句不可能是 develop 的宾语从句。再如：

Following this approach, agents have been developed that, over time, improve their abilities in competitive games such as checkers and chess. 遵循这种方法，开发了相应的主体，这些主体可随着时间的推移提高其在西洋跳棋和国际象棋等竞技游戏中的能力。主句的主语（agents）与其定语从句被谓语（has been developed）分隔开。