**计算机导论**

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20世纪90年代以来，C语言迅速在全世界普及推广。C语言程序设计在计算机教育和计算机应用中发挥着重要作用。我们身为理工科的学生和国家的未来栋梁，应该认真学习C语言。

计算机的本质是“程序的机器”，程序和指令的思想是计算机系统中最基本的概念。只有懂得程序设计，才能进一步懂得计算机，真正了解计算机如何工作的，，更好地理解和应用计算机，掌握用计算机处理问题的方法，培养用计算机解决问题的能力和计算机思维，提高分析问题和解决问题的能力。

一、要学习好计算机就先需要知道计算的的工作原理。

计算机的工作原理: “存储程序” + “程序控制”

1． 以二进制形式表示数据和指令

2． 将程序存入存储器中, 由控制器自动读取并执行

3． 外部存储器存储的程序和所需数据 =⇒ 计算机内存 =⇒ 在程序控制下由

CPU 周而复始地取出指令、分析指令、执行指令 =⇒ 操作完成

二、ascii编码是计算机里各字符所对应的数值，具体见如下表格

**ASCII可显示字符**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | 二进制 | 十进制 | 十六进制 | 图形 | | --- | --- | --- | --- | | 0010 0000 | 32 | 20 | （空格）(␠) | | 0010 0001 | 33 | 21 | ! | | 0010 0010 | 34 | 22 | " | | 0010 0011 | 35 | 23 | # | | 0010 0100 | 36 | 24 | $ | | 0010 0101 | 37 | 25 | % | | 0010 0110 | 38 | 26 | & | | 0010 0111 | 39 | 27 | ' | | 0010 1000 | 40 | 28 | ( | | 0010 1001 | 41 | 29 | ) | | 0010 1010 | 42 | 2A | \* | | 0010 1011 | 43 | 2B | + | | 0010 1100 | 44 | 2C | , | | 0010 1101 | 45 | 2D | - | | 0010 1110 | 46 | 2E | . | | 0010 1111 | 47 | 2F | / | | 0011 0000 | 48 | 30 | 0 | | 0011 0001 | 49 | 31 | 1 | | 0011 0010 | 50 | 32 | 2 | | 0011 0011 | 51 | 33 | 3 | | 0011 0100 | 52 | 34 | 4 | | 0011 0101 | 53 | 35 | 5 | | 0011 0110 | 54 | 36 | 6 | | 0011 0111 | 55 | 37 | 7 | | 0011 1000 | 56 | 38 | 8 | | 0011 1001 | 57 | 39 | 9 | | 0011 1010 | 58 | 3A | : | | 0011 1011 | 59 | 3B | ; | | 0011 1100 | 60 | 3C | < | | 0011 1101 | 61 | 3D | = | | 0011 1110 | 62 | 3E | > | | 0011 1111 | 63 | 3F | ? | |  | | 二进制 | 十进制 | 十六进制 | 图形 | | --- | --- | --- | --- | | 0100 0000 | 64 | 40 | @ | | 0100 0001 | 65 | 41 | A | | 0100 0010 | 66 | 42 | B | | 0100 0011 | 67 | 43 | C | | 0100 0100 | 68 | 44 | D | | 0100 0101 | 69 | 45 | E | | 0100 0110 | 70 | 46 | F | | 0100 0111 | 71 | 47 | G | | 0100 1000 | 72 | 48 | H | | 0100 1001 | 73 | 49 | I | | 0100 1010 | 74 | 4A | J | | 0100 1011 | 75 | 4B | K | | 0100 1100 | 76 | 4C | L | | 0100 1101 | 77 | 4D | M | | 0100 1110 | 78 | 4E | N | | 0100 1111 | 79 | 4F | O | | 0101 0000 | 80 | 50 | P | | 0101 0001 | 81 | 51 | Q | | 0101 0010 | 82 | 52 | R | | 0101 0011 | 83 | 53 | S | | 0101 0100 | 84 | 54 | T | | 0101 0101 | 85 | 55 | U | | 0101 0110 | 86 | 56 | V | | 0101 0111 | 87 | 57 | W | | 0101 1000 | 88 | 58 | X | | 0101 1001 | 89 | 59 | Y | | 0101 1010 | 90 | 5A | Z | | 0101 1011 | 91 | 5B | [ | | 0101 1100 | 92 | 5C | \ | | 0101 1101 | 93 | 5D | ] | | 0101 1110 | 94 | 5E | ^ | | 0101 1111 | 95 | 5F | \_ | |  | | 二进制 | 十进制 | 十六进制 | 图形 | | --- | --- | --- | --- | | 0110 0000 | 96 | 60 | ` | | 0110 0001 | 97 | 61 | a | | 0110 0010 | 98 | 62 | b | | 0110 0011 | 99 | 63 | c | | 0110 0100 | 100 | 64 | d | | 0110 0101 | 101 | 65 | e | | 0110 0110 | 102 | 66 | f | | 0110 0111 | 103 | 67 | g | | 0110 1000 | 104 | 68 | h | | 0110 1001 | 105 | 69 | i | | 0110 1010 | 106 | 6A | j | | 0110 1011 | 107 | 6B | k | | 0110 1100 | 108 | 6C | l | | 0110 1101 | 109 | 6D | m | | 0110 1110 | 110 | 6E | n | | 0110 1111 | 111 | 6F | o | | 0111 0000 | 112 | 70 | p | | 0111 0001 | 113 | 71 | q | | 0111 0010 | 114 | 72 | r | | 0111 0011 | 115 | 73 | s | | 0111 0100 | 116 | 74 | t | | 0111 0101 | 117 | 75 | u | | 0111 0110 | 118 | 76 | v | | 0111 0111 | 119 | 77 | w | | 0111 1000 | 120 | 78 | x | | 0111 1001 | 121 | 79 | y | | 0111 1010 | 122 | 7A | z | | 0111 1011 | 123 | 7B | { | | 0111 1100 | 124 | 7C | | | | 0111 1101 | 125 | 7D | } | | 0111 1110 | 126 | 7E | ~ | |

三、计算机语言分为机器语言，汇编语言，高级语言。我们学习的便是高级语言中的c语言，c语言有如下特点：

1.语言简洁、 紧凑， 使用方便、 灵活

2.运算符丰富

3.数据类型丰富

4.C 语言是完全模块化和结构化的语言，具有结构化的控制语句 (顺序、 选择、 循环结构) 用函数作为程序的模块单位，便于实现程序的模块化 。

5.兼具高级语言和低级语言的功能 ，允许直接访问物理地址 ，能进行位 (bit) 操作 ，能实现汇编语言的大部分功能

可以直接对硬件进行操作。

四、程序

1.c语言程序的标准格式

#include<stdio.h> // standard input/output编译预处理指令

int main() // 主函数

{ // 函数开始标志

printf("Hello␣World!"); // 输出一行信息

return 0; // 函数执行完毕返回函数值0

} // 函数结束标志

2.格式符

%d int

%f float

%c char

%lf double

%.2f float 保留两位小数, 四舍五入。不适用于 scanf()。

%.2lf double 保留两位小数, 四舍五入。不适用于 scanf()。

%x int 十六进制显示

%ld long int

3.if条件语句

#include<stdio.h> // standard input/output编译预处理指令

int main() // 主函数

{ // 函数开始标志

int a=10; // 定义变量a为整型数值, 定义变量时，可以 指定变量的初值

if(a>=10)

{

printf("a>=10\n"); // \n为换行符

}

else

{

printf("a<10\n"); // \n为换行符

}

return 0; // 函数执行完毕返回函数值0

} // 函数结束标志

4.while条件语句

#include<stdio.h> // standard input/output编译预处理指令

int main() // 主函数

{ // 函数开始标志

int a=10; // 定义变量a为整型数值, 定义变量时， 可以指定变量的初值

while(a>=0)

{

printf("a=%d\n",a); // \n为换行符

a--; // a= a - 1

}

return 0; // 函数执行完毕返回函数值0

} // 函数结束标志

5. 输入语句 scanf("% 变量格式符", & 变量名);

例如scanf("%d%f",&a,&f); // 尽量简单, 不要有其它字符和'\n'

字符输出函数 putchar

输出语句 printf("原样输出, % 格式符", 对应变量值);

字符输入函数 getchar, 遇到回车, 开始从缓冲区中接收

字符。

余数 r=a%b, a,b 必须是整数。

6. 数学库函数

int abs(int x); 求整数 x 的绝对值

double fabs(double x); 求浮点数 x 的绝对值

double sqrt(double x);

double pow(double x, double y);

int rand(void);

double log(double x); 求 loge x, 即 ln x

double log10(double x); 求 log10 x

7. 逻辑运算

"&&" 和 "ǁ" 是双目运算符， 要求有两个运算对象 (操作数);

"!" 是单目运算符， 只要有一个运算对象

由高到低优先次序: !(非)&&(与)ǁ(或);

逻辑运算符中的 "&&" 和 "||" 低于关系运算符, "!" 高于算术运算符

逻辑运算结果不是 0 就是 1， 不可能是其他数值。

而运算对象可以是 0(假) 或任何非 0 的数值 (按 "真" 对待)

8. 用 switch 语句实现多分支选择结构

int a;

scanf("%d",&a)

switch(a)

{

case 10: 多条语句1;

break;

case 20: 多条语句2;

break;

case 30: 多条语句3;

break;

default: 多条语句4;

}

9.for语句

for(表达式1;表达式2 ;表达式3)

{

// 循环体

执行多条语句;

}

表达式 1: 设置初始条件， 只执

行一次。可以为零个、 一个或多

个变量 (逗号隔开) 设置初值。

表达式 2: 是循环条件表达式，

用来判定是否继续循环。在每

次执行循环体前先执行此表达

式 (包括第 1 次循环)， 决定是否

继续执行循环。

表达式 3: 作为循环的调整， 例

如使循环变量增值， 它是在执行

完循环体后才进行的。

10. break,continue 改变循环执行的状态

（1）while(表达式)

{

printf("语句1");

if(条件表达式) break; //提前终止循环

printf("语句1");

}

break 语句只能用于循环语句和 switch 语句之中， 而不能单独使用。

（2）while(表达式)

{

printf("语句1");

if(条件表达式) continue; //结束本次循环, 进入下轮循环

printf("语句1");

}

注：

continue 语句只结束本次循环， 而非终止整个循环。break 语句结束整个循环， 不再判断执行循环的条件是否成立。

11.数组

int a[10] //从a[0]开始，到a[9]结束