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**C语言枚举类型enum**

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在实际应用中，有的变量只有几种可能取值。如人的性别只有两种可能取值，星期只有七种可能取值。在C 语言中对这样取值比较特殊的变量可以定义为枚举类型。所谓枚举是指将变量的值一一列举出来，变量只限于列举出来的值的范围内取值。 定义一个变量是枚举类型，可以先定义一个枚举类型名，然后再说明这个变量是该枚举类型。

例如： enum weekday{sun,mon,tue,wed,thu,fri,sat}； 定义了一个枚举类型名enum weekday，然后定义变量为该枚举类型。例如： enum weekday day； 当然，也可以直接定义枚举类型变量。例如： enum weekday{sun,mon,tue,wed,thu,fri,sat} day； 其中，sum,mon,…,sat等称为枚举元素或枚举常量，它们是用户定义的标识符。 需要说明的有以下几点。 ①枚举元素不是变量，而是常数，因此枚举元素又称为枚举常量。因为是常量，所以不能对枚举元素进行赋值。 ②枚举元素作为常量，它们是有值的，C语言在编译时按定义的顺序使它们的值为,1,2,…。 在上面的说明中，sun的值为 0，mon 的值为 1，…sat 的值为 6，如果有赋值语句 day=mon； 则 day 变量的值为 1。当然，这个变量值是可以输出的。例如： printf ("%d",day)； 将输出整数 1。 如果在定义枚举类型时指定元素的值，也可以改变枚举元素的值。例如： enum weekday{sun=7,mon=1,tue,wed,thu,fri,sat}day； 这时，sun 为 7，mon 为 1，以后元素顺次加 1，所以 sat 就是 6 了。 ③枚举值可以用来作判断。例如： if (day==mon) {…} if (day>mon) {…} 枚举值的比较规则是：按其在说明时的顺序号比较，如果说明时没有人为指定，则第一个枚举元素的值认作0。例如，mon>sun，sat>fri。 C 语言教程 ?216? ④一个整数不能直接赋给一个枚举变量，必须强制进行类型转换才能赋值。例如： day=(enum weekday)2； 这个赋值的意思是，将顺序号为2 的枚举元素赋给 day，相当于workday=tue； 【例 11.6】从键盘输入一个整数，显示与该整数对应的枚举常量的英文名称。 # include void main( ) { enum weekday {sun,mon,tue,wed,thu,fri,sat} day； int k； printf("input a number(0--6)")； scanf("%d",&k)； day=(enum weekday)k； switch(day) { case sun：printf("sunday/n")；break； case mon：printf("monday/n")；break； case tue：printf("tuesday/n")；break； case wed：printf("wednesday/n")；break； case thu：printf("thursday/n")；break； case fri：printf("friday/n")；break； case sat：printf("satday/n")；break； default：printf("input error/n")；break； } } 程序运行结果为： input a number(0--6)1 monday 在该程序中，枚举常量与枚举变量可以进行比较，但要输出枚举常量对应的英文单词，不能使用以下语句： printf(" %s",mon)； 因为枚举常量 mon 为整数值，而非字符串。 在使用枚举变量时，主要关心的不是它的值的大小，而是其表示的状态。

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注：以下全部代码的执行环境为VC++ 6.0

在程序中，可能需要为某些整数定义一个别名，我们可以利用预处理指令#define来完成这项工作，您的代码可能是：

 #define MON  1 #define TUE   2 #define WED  3 #define THU   4 #define FRI    5 #define SAT   6 #define SUN   7

在此，我们定义一种新的数据类型，希望它能完成同样的工作。这种新的数据类型叫枚举型。

1. 定义一种新的数据类型 - 枚举型

以下代码定义了这种新的数据类型 - 枚举型

 enum DAY {       MON=1, TUE, WED, THU, FRI, SAT, SUN };

(1)枚举型是一个集合，集合中的元素(枚举成员)是一些命名的整型常量，元素之间用逗号,隔开。

(2)DAY是一个标识符，可以看成这个集合的名字，是一个可选项，即是可有可无的项。

(3)第一个枚举成员的默认值为整型的0，后续枚举成员的值在前一个成员上加1。

(4)可以人为设定枚举成员的值，从而自定义某个范围内的整数。

(5)枚举型是预处理指令#define的替代。

(6)类型定义以分号;结束。

2.使用枚举类型对变量进行声明

新的数据类型定义完成后，它就可以使用了。我们已经见过最基本的数据类型，如：整型int,单精度浮点型float, 双精度浮点型double,字符型char, 短整型short等等。用这些基本数据类型声明变量通常是这样：

 char     a; //变量a的类型均为字符型char char     letter; int        x,            y,            z; //变量x,y和z的类型均为整型int int       number; double  m, n; double  result; //变量result的类型为双精度浮点型double

既然枚举也是一种数据类型，那么它和基本数据类型一样也可以对变量进行声明。

方法一：枚举类型的定义和变量的声明分开

 enum DAY {       MON=1, TUE, WED, THU, FRI, SAT, SUN };

 enum DAY yesterday; enum DAY today; enum DAY tomorrow; //变量 tomorrow的类型为枚举型enum DAY enum DAY good\_day, bad\_day; //变量good\_day和bad\_day的类型均为枚举型enum DAY

方法二：类型定义与变量声明同时进行：

 enum //跟第一个定义不同的是，此处的标号DAY省略，这是允许的。 {     saturday,     sunday = 0,     monday,     tuesday,     wednesday,     thursday,     friday } workday; //变量workday的类型为枚举型enum DAY

 enum week { Mon=1, Tue, Wed, Thu, Fri Sat, Sun} days; //变量days的类型为枚举型enum week

 enum BOOLEAN { false, true } end\_flag, match\_flag; //定义枚举类型并声明了两个枚举型变量

方法三：用typedef关键字将枚举类型定义成别名，并利用该别名进行变量声明：

 typedef enum workday {     saturday,     sunday = 0,     monday,     tuesday,     wednesday,     thursday,     friday } workday; //此处的workday为枚举型enum workday的别名

 workday today, tomorrow; //变量today和tomorrow的类型为枚举型workday，也即enum workday

enumworkday中的workday可以省略：

 typedef enum {     saturday,     sunday = 0,     monday,     tuesday,     wednesday,     thursday,     friday } workday; //此处的workday为枚举型enum workday的别名 workday today, tomorrow; //变量today和tomorrow的类型为枚举型workday，也即enum workday

也可以用这种方式：

 typedef enum workday {     saturday,     sunday = 0,     monday,     tuesday,     wednesday,     thursday,     friday }; workday today, tomorrow; //变量today和tomorrow的类型为枚举型workday，也即enum workday

注意：同一个程序中不能定义同名的枚举类型，不同的枚举类型中也不能存在同名的命名常量。错误示例如下所示：

错误声明一：存在同名的枚举类型

 typedef enum {     wednesday,     thursday,     friday } workday; typedef enum WEEK {     saturday,     sunday = 0,     monday, } workday;

错误声明二：存在同名的枚举成员

 typedef enum {     wednesday,     thursday,     friday } workday\_1; typedef enum WEEK {     wednesday,     sunday = 0,     monday, } workday\_2;

3.使用枚举类型的变量

3.1对枚举型的变量赋值。

实例将枚举类型的赋值与基本数据类型的赋值进行了对比：

方法一：先声明变量，再对变量赋值

 #include<stdio.h> /\* 定义枚举类型 \*/ enum DAY { MON=1, TUE, WED, THU, FRI, SAT, SUN }; void main() {     /\* 使用基本数据类型声明变量，然后对变量赋值 \*/     int x, y, z;         x = 10;     y = 20;     z = 30;         /\* 使用枚举类型声明变量，再对枚举型变量赋值 \*/     enum DAY yesterday, today, tomorrow;         yesterday = MON;     today     = TUE;     tomorrow  = WED;     printf("%d %d %d /n", yesterday, today, tomorrow); }

方法二：声明变量的同时赋初值

 #include <stdio.h> /\* 定义枚举类型 \*/ enum DAY { MON=1, TUE, WED, THU, FRI, SAT, SUN }; void main() {     /\* 使用基本数据类型声明变量同时对变量赋初值 \*/     int x=10, y=20, z=30;     /\* 使用枚举类型声明变量同时对枚举型变量赋初值 \*/     enum DAY yesterday = MON,                        today = TUE,                   tomorrow = WED;     printf("%d %d %d /n", yesterday, today, tomorrow); }

方法三：定义类型的同时声明变量，然后对变量赋值。

 #include <stdio.h> /\* 定义枚举类型，同时声明该类型的三个变量，它们都为全局变量 \*/ enum DAY { MON=1, TUE, WED, THU, FRI, SAT, SUN } yesterday, today, tomorrow; /\* 定义三个具有基本数据类型的变量，它们都为全局变量 \*/ int x, y, z; void main() {     /\* 对基本数据类型的变量赋值 \*/     x = 10;  y = 20;  z = 30;         /\* 对枚举型的变量赋值 \*/     yesterday = MON;     today     = TUE;     tomorrow  = WED;     printf("%d %d %d /n", x, y, z); //输出：10 20 30     printf("%d %d %d /n", yesterday, today, tomorrow); //输出：1 2 3 }

方法四：类型定义，变量声明，赋初值同时进行。

 #include <stdio.h> /\* 定义枚举类型，同时声明该类型的三个变量，并赋初值。它们都为全局变量 \*/ enum DAY {     MON=1,     TUE,     WED,     THU,     FRI,     SAT,     SUN } yesterday = MON, today = TUE, tomorrow = WED; /\* 定义三个具有基本数据类型的变量，并赋初值。它们都为全局变量 \*/ int x = 10, y = 20, z = 30; void main() {     printf("%d %d %d /n", x, y, z); //输出：10 20 30     printf("%d %d %d /n", yesterday, today, tomorrow); //输出：1 2 3 }

3.2对枚举型的变量赋整数值时，需要进行类型转换。

 #include <stdio.h> enum DAY { MON=1, TUE, WED, THU, FRI, SAT, SUN }; void main() {     enum DAY yesterday, today, tomorrow;     yesterday = TUE;     today = (enum DAY) (yesterday + 1); //类型转换     tomorrow = (enum DAY) 30; //类型转换     //tomorrow = 3; //错误     printf("%d %d %d /n", yesterday, today, tomorrow); //输出：2 3 30 }

3.3使用枚举型变量

 #include<stdio.h> enum {     BELL          = '/a',     BACKSPACE = '/b',     HTAB        = '/t',     RETURN      = '/r',     NEWLINE    = '/n',     VTAB        = '/v',     SPACE      = ' ' }; enum BOOLEAN { FALSE = 0, TRUE } match\_flag; void main() {     int index = 0;     int count\_of\_letter = 0;     int count\_of\_space = 0;     char str[] = "I'm Ely efod";     match\_flag = FALSE;     for(; str[index] != '/0'; index++)         if( SPACE != str[index] )             count\_of\_letter++;         else         {             match\_flag = (enum BOOLEAN) 1;             count\_of\_space++;         }         printf("%s %d times %c", match\_flag ? "match" : "not match", count\_of\_space, NEWLINE);     printf("count of letters: %d %c%c", count\_of\_letter, NEWLINE, RETURN); }

输出： match 2 times count of letters: 10 Press any key to continue

4. 枚举类型与sizeof运算符

 #include <stdio.h> enum escapes {     BELL      = '/a',     BACKSPACE = '/b',     HTAB      = '/t',     RETURN    = '/r',     NEWLINE   = '/n',     VTAB      = '/v',     SPACE     = ' ' }; enum BOOLEAN { FALSE = 0, TRUE } match\_flag; void main() {     printf("%d bytes /n", sizeof(enum escapes)); //4 bytes     printf("%d bytes /n", sizeof(escapes)); //4 bytes     printf("%d bytes /n", sizeof(enum BOOLEAN)); //4 bytes     printf("%d bytes /n", sizeof(BOOLEAN)); //4 bytes     printf("%d bytes /n", sizeof(match\_flag)); //4 bytes     printf("%d bytes /n", sizeof(SPACE)); //4 bytes     printf("%d bytes /n", sizeof(NEWLINE)); //4 bytes     printf("%d bytes /n", sizeof(FALSE)); //4 bytes     printf("%d bytes /n", sizeof(0)); //4 bytes }

5. 综合举例

 #include<stdio.h> enum Season {     spring, summer=100, fall=96, winter }; typedef enum {     Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday } Weekday; void main() {     /\* Season \*/     printf("%d /n", spring); // 0     printf("%d, %c /n", summer, summer); // 100, d     printf("%d /n", fall+winter); // 193     Season mySeason=winter;     if(winter==mySeason)         printf("mySeason is winter /n"); // mySeason is winter         int x=100;     if(x==summer)         printf("x is equal to summer/n"); // x is equal to summer     printf("%d bytes/n", sizeof(spring)); // 4 bytes     /\* Weekday \*/     printf("sizeof Weekday is: %d /n", sizeof(Weekday)); //sizeof Weekday is: 4     Weekday today = Saturday;     Weekday tomorrow;     if(today == Monday)         tomorrow = Tuesday;     else         tomorrow = (Weekday) (today + 1); //remember to convert from int to Weekday }

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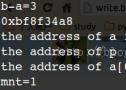
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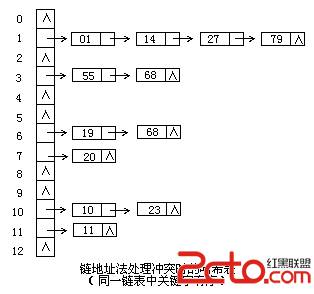
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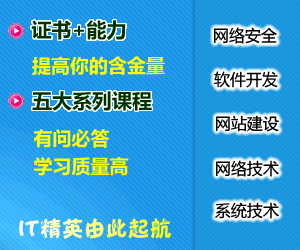
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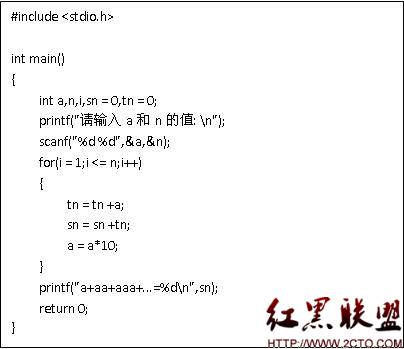
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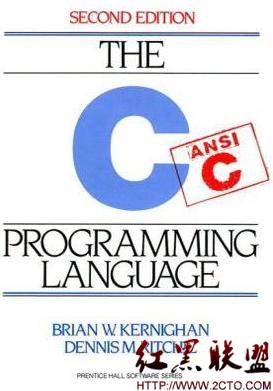
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