



第8章 指针

——指针变量做函数参数:典型实例



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一个典型实例——两数互换

程序 1：基本类型变量作函数参数

```
int main()  
{  
    int a, b;  
    a = 5;  
    b = 9;  
    Swap(a, b);  
    printf("a=%d,b=%d", a, b);  
    return 0;  
}
```

```
void Swap(int x, int y)  
{  
    int temp;  
    temp = x;  
    x = y;  
    y = temp;  
}
```

实参

形参

Not Work! Why?

程序 2：指针类型变量作函数参数

```
int main()  
{  
    int a, b;  
    a = 5;  
    b = 9;  
    Swap(&a, &b);  
    printf("a=%d,b=%d", a, b);  
    return 0;  
}
```

```
void Swap(int *x, int *y)  
{  
    int temp;  
    temp = *x;  
    *x = *y;  
    *y = temp;  
}
```



一个典型实例——两数互换

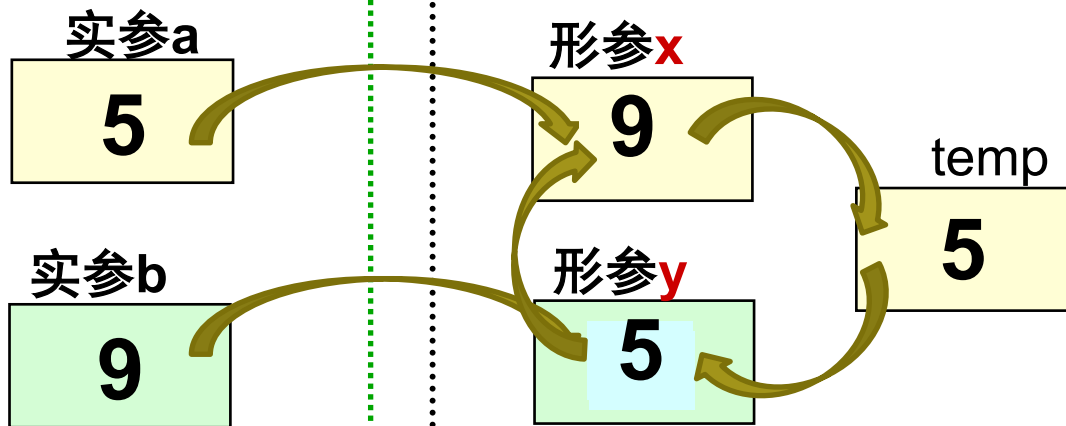
```
int main()
{
    int a = 5, b = 9;

    Swap(a, b);

    printf("a=%d,b=%d", a, b);
    return 0;
}
```

```
void Swap(int x, int y)
{
    int temp;
    temp = x;
    x = y;
    y = temp;
}
```

Call by **value**



x与y的互换

一个典型实例——两数互换

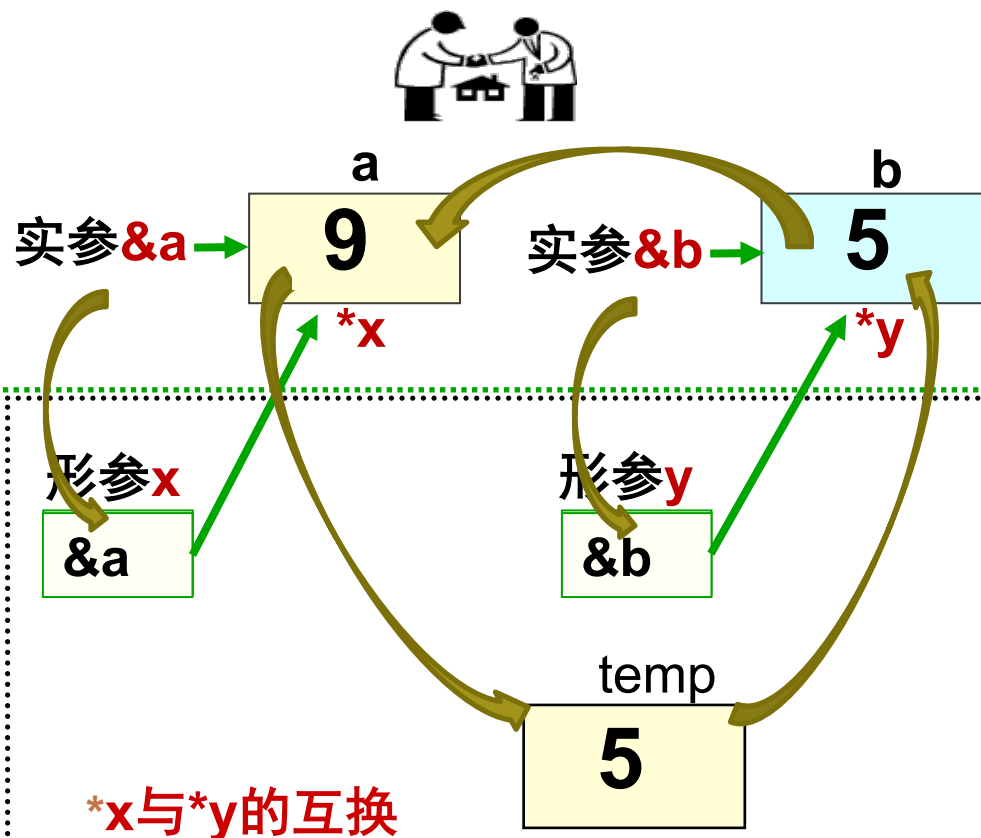
```
int main()
{
    int a = 5, b = 9;

    Swap(&a, &b);

    printf("a=%d,b=%d", a, b);
    return 0;
}
```

```
void Swap(int *x, int *y)
{
    int temp;
    temp = *x;
    *x = *y;
    *y = temp;
}
```

Simulating call by reference



一个典型实例——两数互换

```
int main()
{
    int a = 5, b = 9;

    Swap(a, b);

    printf("a=%d,b=%d", a, b);
    return 0;
}
```

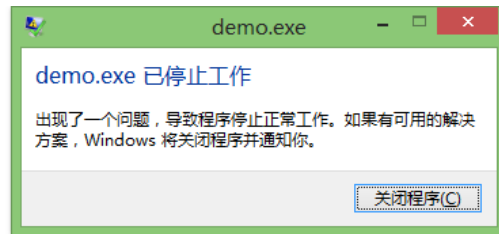
```
void Swap(int *x, int *y)
{
    int temp;
    temp = *x;
    *x = *y;
    *y = temp;
}
```

某些编译器检查实参和形参的数据类型是否匹配，不匹配则给出警告

```
warning: passing argument 1 of 'Swap' makes pointer from integer without a cast
note: expected 'int *' but argument is of type 'int'
warning: passing argument 2 of 'Swap' makes pointer from integer without a cast
note: expected 'int *' but argument is of type 'int'
```

另一些编译器直接将实参的值当作地址值，产生非法内存访问，导致程序异常终止

```
scanf("%d", a);
```



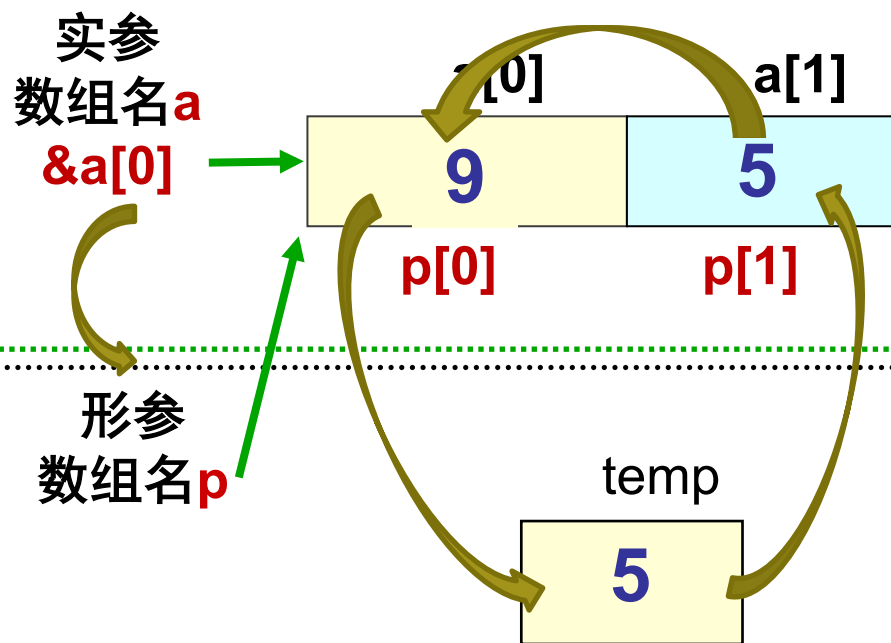
一个典型实例——两数互换

```
int main()
{
    int a[2] = {5, 9};

    Swap(a);

    printf("%d,%d", a[0],
a[1]);
    return 0;
}
```

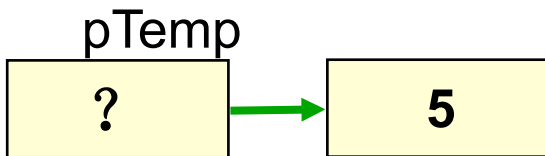
```
void Swap(int p[])
{
    int temp;
    temp = p[0];
    p[0] = p[1];
    p[1] = temp;
}
```



Errors

```
void Swap(int *x, int *y)
{
    int *pTemp;

    *pTemp = *x;
    *x = *y;
    *y = *pTemp;
}
```

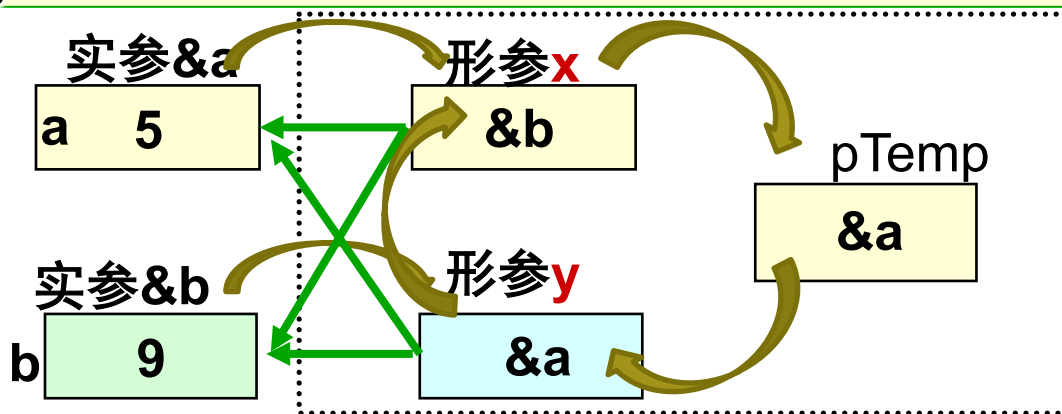


不能借助一个未初始化的
指针变量进行两数互换

```
void Swap(int *x, int *y)
{
    int *pTemp;

    pTemp = x;
    x = y;
    y = pTemp;
}
```

借助指针pTemp交换的
是地址值(即x和y的指向)
不是指针指向的内容



讨论

- 为什么这个程序编译时不会给出“使用了未初始化的指针”的警告信息呢？如果将pTemp改为int型变量，而不是int型指针变量，是否可以呢？请解释原因。

```
void Swap(int *x, int *y)
{
    int *pTemp;

    pTemp = x;
    x = y;
    y = pTemp;
}
```



