

第6章

数组

基本数据类型

如何表示一组数据？

声明

一维数组

数据类型 数组名[数组长度];

```
int name[7];
```

一维数组

int, float...

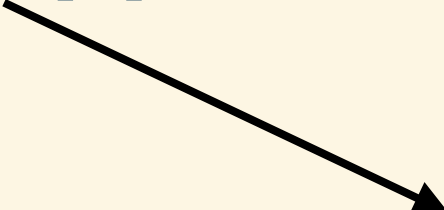
标识符

常量

数据类型 数组名[数组长度];

声明

```
int name[7];
```



0	1	2	3	4	5	6
---	---	---	---	---	---	---

```
#define N 9
```

```
int n = 9;
```

```
int a1[9];
```

```
int a2[N];
```

```
int a3[n];
```

```
#define N 9
```

```
int n = 9;
```

```
int a1[9]; ✓
```

```
int a2[N]; ✓
```

```
int a3[n]; ✗
```


引用

```
int name[10];
```

```
name[2] = 90;
```

```
scanf("%d", &name[4]);
```

```
printf("%d\n", name[5]);
```

0	1	2	3	4	5	6
---	---	---	---	---	---	---

初始化

```
int array[5] = {1, 2, 3, 4, 5};
```

```
int array[] = {1, 2, 3, 4, 5};
```

```
int array[5] = {1, 2};
```

```
int array[5] = {1, 2, 3, 4, 5, 6, 7};
```

```
int array[5] = {1, 2, 3, 4, 5};
```

```
int array[] = {1, 2, 3, 4, 5};
```

array长度为5

```
int array[5] = {1, 2};
```

自动补0

```
int array[5] = {1, 2, 3, 4, 5, 6, 7};
```



输入9个数并逆序打印

```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
    int a[9], i;
```

```
    for (i = 0; i < 9; i++)  
        scanf("%d", &a[i]);
```

```
    for (i = 8; i >= 0; i--)  
        printf("%d ", a[i]);
```

```
    putchar( '\n' );
```

```
    return 0;
```

```
}
```

输入9个数找出最大值


```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
    int a[9], i, m;
```

```
    for (i = 0; i < 9; i++)  
        scanf("%d", &a[i]);
```

```
    m = a[0];
```

```
    for (i = 1; i < 9; i++)  
        if (a[i] > m)  
            m = a[i];
```

```
    printf("%d\n", m);
```

```
    return 0;
```

```
}
```

输9个数从大到小排序

```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
    int a[9], i, j, m, t;
```

```
    for (i = 0; i < 9; i++)  
        scanf("%d", &a[i]);
```

```
    for (i = 0; i < 8; i++) {  
        m = i;
```

```
        for (j = i+1; j < 9; j++)  
            if (a[j] > a[m])  
                m = j;
```

```
        t = a[i];  
        a[i] = a[m];  
        a[m] = t;
```

```
    }
```

```
    for (i = 0; i < 9; i++)  
        printf("%d ", a[i]);
```

```
    putchar('\n');
```

```
    return 0;
```

```
}
```

如何表示矩阵？

二维数组

二维数组

int,float...

标识符

常量

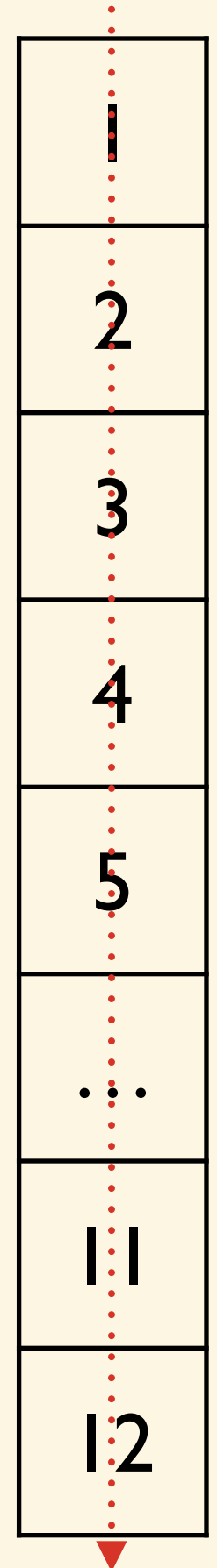
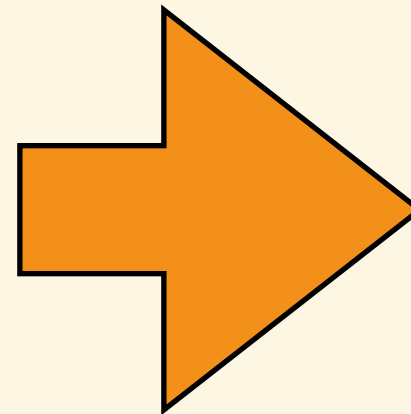
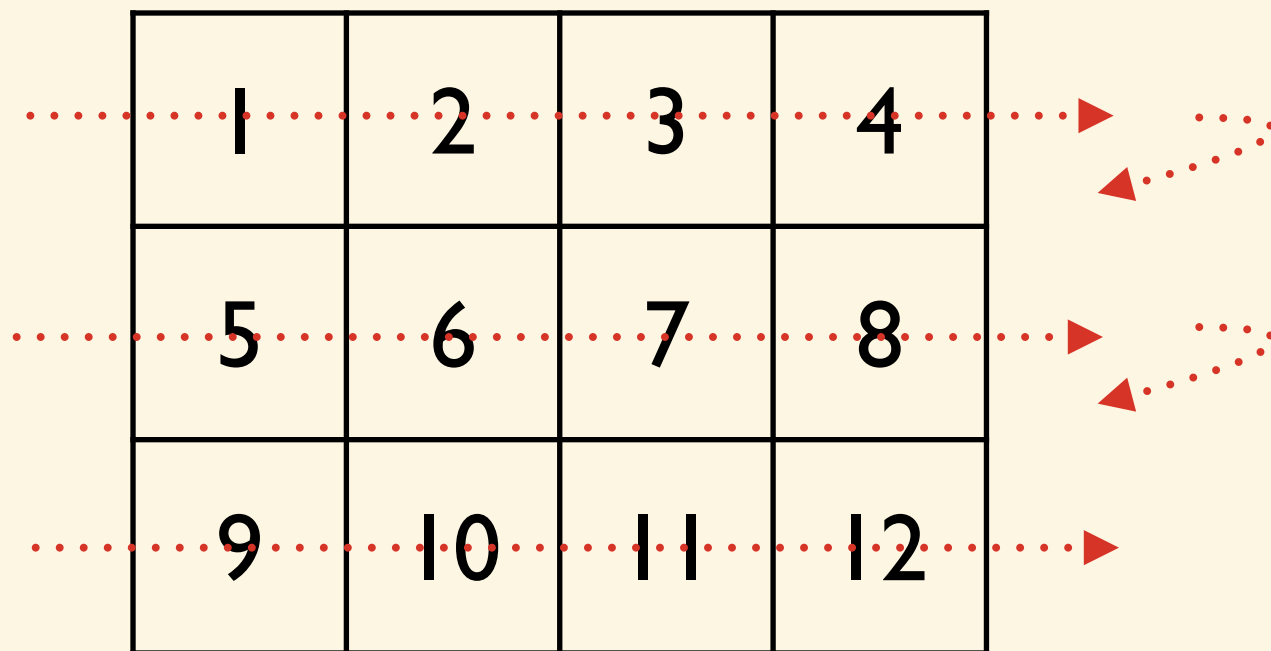
数据类型 数组名[数组行][数组列];

声明

```
int matrix[3][4];
```

二维数组排列

```
int matrix[3][4];
```



初始化


```
int a[2][3] = {{1, 2, 3}, {4, 5, 6}};
```

```
int a[2][3] = {1, 2, 3, 4, 5, 6};
```

```
int a[2][3] = {{1}, {4}};
```

```
int a[][3] = {{1, 2, 3}, {4, 5, 6}};
```

打印杨辉三角

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
.....

```
#include <stdio.h>
```

```
#define N 11
```

```
int main ()
```

```
{  
    int i, j, a[N][N];  
    for(i = 1; i < N; i++) {  
        a[i][1] = 1;  
        a[i][i] = 1;  
    }  
    for(i = 3; i < N; i++)  
        for(j = 2; j < i; j++)  
            a[i][j] = a[i-1][j-1] + a[i-1][j];  
  
    for(i = 1; i < N; i++) {  
        for(j = 1; j <= i; j++)  
            printf("%6d", a[i][j]);  
  
        printf("\n");  
    }  
  
    return 0;  
}
```

高维数组.....

字符数组

```
char c[5] = {'H', 'e', 'l', 'l', 'o'};
```

```
char c[] = {'H', 'e', 'l', 'l', 'o'};
```

```
char c[6] = "Hello";
```

```
char c[] = "Hello";
```

```
char c[6];
```

```
c = "Hello"; ❌
```

输出字符串

逐个输出


```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
    int i;
```

```
    char s[] = "Hello";
```

```
    for (i = 0; i < 5; i++)
```

```
        putchar(s[i]);
```

```
    putchar( '\n' );
```

```
    return 0;
```

```
}
```

字符串

- 双引号括起来的一串字符
- 以'\0'结尾
- 与字符数组的区别

整体输入输出

```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
    char str[100];
```

```
    scanf("%s", str);
```

```
    printf("%s\n", str);
```

```
    return 0;
```

```
}
```

```
#include <stdio.h>
```

```
int main()
```

```
{
```

```
    char str[100];
```

```
    gets(str);
```

```
    puts(str);
```

```
    return 0;
```

```
}
```

scanf 与 gets的区别

- scanf 遇到空白符结束
- gets 遇到换行符结束

printf 与 puts 的区别

- puts 会在字符串末尾加换行符，printf 不会

说明

- 输出字符不包含‘\0’
- 用%s时，输出是数组名，不是数组元素
- 若数组长度大于字符串长度，输出到‘\0’为止
- 若有多个‘\0’，输出到第一个为止

字符串函数

```
#include <string.h>
```

gets、puts - 输入输出

```
char str[100];
```

```
gets(str);
```

```
puts(str);
```

strlen - 字符串长度

```
#include <stdio.h>
#include <string.h>

int main()
{
    char str[] = "Hello";

    printf("Length of %s: %lu\n", str, strlen(str));

    return 0;
}
```

strcat - 字符串连接

```
#include <stdio.h>
#include <string.h>

int main()
{
    char s1[100] = "Hello";
    char s2[] = " world";

    strcat(s1, s2);

    printf("%s\n", s1);

    return 0;
}
```

strcpy - 字符串复制

```
#include <stdio.h>
#include <string.h>

int main()
{
    char str[100];

    strcpy(str, "Hello world");

    puts(str);

    return 0;
}
```

strcmp - 字符串比较

```
strcmp(str1, str2);
```

- 字典序
- 返回值

输入5个字符串
打印出最小的

```
#include <stdio.h>
#include <string.h>

int main()
{
    char str[100], min_str[100];
    int i;

    gets(str);
    strcpy(min_str, str);

    for(i = 0; i < 4; i++) {
        gets(str);

        if(strcmp(min_str, str) > 0)
            strcpy(min_str, str);
    }

    printf("Minimal string: %s\n", min_str);

    return 0;
}
```


二维字符数组

```
char str[3][10] =  
{ "China", "U.S.A", "Canada"};
```

C	h	i	n	a	\0				
U	.	S	.	A	\0				
C	a	n	a	d	a	\0			

输入5个字符串并排序

```
#include <stdio.h>
#include <string.h>

int main()
{
    char a[5][100], t[100];
    int i, j, m;

    for (i = 0; i < 5; i++)
        gets(a[i]);

    for (i = 0; i < 4; i++) {
        m = i;

        for (j = i+1; j < 5; j++)
            if (strcmp(a[j], a[m]) > 0)
                m = j;

        if (i != m) {
            strcpy(t, a[i]);
            strcpy(a[i], a[m]);
            strcpy(a[m], t);
        }
    }

    for (i = 0; i < 5; i++)
        printf("%s ", a[i]);

    putchar('\n');

    return 0;
}
```

统计单词数

提示

- 单词开始：前一个是空白，当前不是空白
- 单词结束：前一个不是空白，当前是空白
-