

Chapter 8

Array

When proceeding to looping, we begin with a question that how a computer can repeat doing a job.

Here is a challenging task, the user inputs a positive integer N less than 4 followed by N integers and asks you to display the numbers in ascending order.

Obviously, we need N variables to store those numbers.

But the number of variables needed is varying, which is far different from all problems arise in previous chapters.

Of course, you can solve this problem case by case, using **nested-if** to check if N is 1, 2, 3 and n1, n2, n3 to be the name of variables, when N is 1 , use n1 to store, N is 2 use n1, n2 to store etc...

You can imagine how large will the code be, and it is a stupid way.

In C, there is syntax for opening a large number of variables in one line, and this kind of data type is called **array**.

Syntax:

```
Data_Type Name[N];
```

This will open N variables with name Name[0] , Name[1], to Name[N-1]

The number 0, 1,...,N-1 is called the **index**.

In C, **index** must begin from 0 and ends with N-1.

Examples:

```
int A[10];
```

```
int A[3]={4,5,6}; // A[0] = 4; A[1]=5; A[2]=6;
```

Structure of array:

A[0]	A[1]	A[2]	A[3]	A[4]	A[5]	A[6]	A[7]	A[8]	A[9]

Multidimensional array:

```
Data_Type Name[N][M];
```

```
Data_Type Name[N][M][P];
```

Programming Exercises:

1. (Pattern) 2. Using Sieve of Eratosthenes to find prime number in 1-1000.

5
12345
23451
34512
45123
51234

3. (a) Generate 100 random numbers (1-10000) and find the maximum and minimum.
(b) Display them in ascending order.
(c) Display them in descending order.

4.

Given N integers ($0 < N < 10000$), please take some integers such that their sum is divisible by N.

The absolute value of each integer is smaller than 10000.

Sample: (All italics words are inputted by the user)

Input:
5
Input 5 numbers:
4 6 7 8 10
Output:
4+6=10 is divisible by 5

Input:
4
Input 4 numbers:
7 11 3 6
Output:
3+6+11=20 is divisible by 4

Input:
3
Input 5 numbers:
2 2 2
Output:
2+2+2=6 is divisible by 3.

Game Programming:

<http://www.geocities.com/SiliconValley/Park/3230/pas/pasq1006.html> #5

HKOI past paper:

2007HJE A: #8, #23, #29, B: #1, #3, #4

2006HJE A: #5, #20, #4, #7,

2005HJE A: #3, #8, #15, #17, #19, #25, #27 B: #3, #5, #9

End of Chapter