Array

Definition

An array is a special variable that can store more than one value of the same data type and can be arranged using an index. Arrays can be defined with the syntax:

```
/* defines an array of 10 integers */
int numbers[10];
```

Accessing the value or data in the array can be done with the same syntax. Arrays in C programming language are zero-based, which means that if we define an array with size 10, then what is formed is an array with index 0 to 9 inclusively.

```
int numbers[10];

/* populate the array */
numbers[0] = 10;
numbers[1] = 20;
numbers[2] = 30;
numbers[3] = 40;
numbers[4] = 50;
numbers[5] = 60;
numbers[6] = 70;

/* print the 7th number from the array, which has an index of 6 with value 70*/
printf("The 7th number in the array is %d", numbers[6]);
```

An array can only have one variable type, this is because the array is implemented as a sequence of a value in computer memory. Therefore, accessing the array index specifically is very efficient.

Arrays can also be defined as multidimensional, meaning that the array has rows and columns that can be accessed using an index.

```
int x[3][4] = {{0, 1, 2, 3}, {4, 5, 6, 7}, {8, 9, 10, 11}};
```

In the example array x above, it is a 2-dimensional array that has 3 rows and 4 columns. The value of x[0][1] is 1.

Array Implementation

```c
int even_num[5];
int i, num = 0;

/* fill array with even numbers using for loop */
for (i = 0; i < 5; i++) {
  even_num[i] = num;
  num = num + 2;
}
```

In the program above, we define an array variable named even_num which functions to store 5 even numbers sequentially. By using a for loop, we can access each index on even_num without writing the index one by one.

Array of Characters

An array with a char data type can allow string data to be stored into a variable. As in the program above, a string in C programming language is actually an array of characters.

```c
char string[15] = {'H', 'e', 'l', 'l', 'o', ' ', 'W', 'o', 'r', 'l', 'd', '\0'};

/* is the same as */
char string[15] = "Hello World";

printf("%s", string);

/*
The output will be:
Hello World
*/
```

The string variable stores data in the form of Hello World. Whereas in string[12] it is given the value '\0' as a sign of the end of the data or string in C programming language.

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