Belajaritma

Algoritma dan Pemrograman

Sesi VII: Pengenalan Array
(PDF Example)

It is a type of data structure that can store many values in a specific data type.

Declaring Arrays

`dataType arrayName[arraySize];` - basic structure of declaring arrays

`int number[];` - declaring array without a specific size

`int number[69];` - declaring array with a size of 69

`int number[69] = {};` - declaring array with size of 69 and a value of (0)

`float gpa[3] = {3.0, 3.9, 2.4};` - declaring array with values.

`float gpa[3] = {3.0};` - declaring array with some values initialized (missing values are set to 0)

Multidimensional Arrays

In simple terms : Array of arrays. Think of it as a grid.

Example :

```
float x[3][4];
```

where the structure of this array will be :

	Column 1	Column 2	Column 3	Column 4
Row 1	x[0][0]	x[0][1]	x[0][2]	x[0][3]
Row 2	x[1][0]	x[1][1]	x[1][2]	x[1][3]
Row 3	x[2][0]	x[2][1]	x[2][2]	x[2][3]

or imagine `int[3][3][3]` as a cube-like structure.

Accessing Arrays

Assume that `int num [5] = {1,3,5,9,10};`

thus,

`printf("%d",num[1]);` = 3

if accessing with a pointer,

`printf("%d",*(num+1));` = 3

Examples

1D Array Example :

```c
// Program to take 5 values from the user and store them in an array
// Print the elements stored in the array
#include <stdio.h>
int main()
{
  int values[5];

  printf("Enter 5 integers:\n");

  // taking input and storing it in an array
  for(int i = 0; i < 5; ++i)
   {
     scanf("%d", &values[i]);
   }

  printf("Displaying integers:\n");

  // printing elements of an array
  for(int i = 0; i < 5; ++i)
  {
     printf("%d\n", values[i]);
  }
  return 0;
}
```

2D Array Example :

```c
// C program to find the sum of two matrices of order 2*2

#include <stdio.h>
int main()
{
  float a[2][2], b[2][2], result[2][2];

  // Taking input using nested for loop
  printf("Enter elements of 1st matrix\n");
  for (int i = 0; i < 2; ++i)
    for (int j = 0; j < 2; ++j)
    {
      printf("Enter a%d%d: ", i + 1, j + 1);
      scanf("%f", &a[i][j]);
    }

  // Taking input using nested for loop
  printf("Enter elements of 2nd matrix\n");
  for (int i = 0; i < 2; ++i)
    for (int j = 0; j < 2; ++j)
    {
      printf("Enter b%d%d: ", i + 1, j + 1);
      scanf("%f", &b[i][j]);
    }

  // adding corresponding elements of two arrays
  for (int i = 0; i < 2; ++i)
    for (int j = 0; j < 2; ++j)
    {
      result[i][j] = a[i][j] + b[i][j];
    }

  // Displaying the sum
  printf("\nSum Of Matrix:");

  for (int i = 0; i < 2; ++i)
    for (int j = 0; j < 2; ++j)
    {
      printf("%.1f\t", result[i][j]);

      if (j == 1)
        printf("\n");
    }
  return 0;
}
```

3D Array Example :

```c
// C Program to store and print 12 values entered by the user

#include <stdio.h>int main()
{
  int test[2][3][2];

  printf("Enter 12 values: \n");

  for (int i = 0; i < 2; ++i)
  {
    for (int j = 0; j < 3; ++j)
    {
      for (int k = 0; k < 2; ++k)
      {
        scanf("%d", &test[i][j][k]);
      }
    }
  }

  // Printing values with proper index.

  printf("\nDisplaying values:\n");
  for (int i = 0; i < 2; ++i)
  {
    for (int j = 0; j < 3; ++j)
    {
      for (int k = 0; k < 2; ++k)
      {
        printf("test[%d][%d][%d] = %d\n", i, j, k, test[i][j][k]);
      }
    }
  }

  return 0;
}
```