Programming and Problem Solving through C Language
O Level / A Level

Chapter - 6 : Functions

Structures and Arrays

1. Structures Containing Arrays
2. Arrays of Structures

Structures Containing Arrays

- One can define a structure that contains one or more arrays as members.
- The array can be of any C data type (int, char, and so on).
- For example, consider the declaration below.

```
struct data
{       int x[4];
        char y[10];
};
```

This statements define a structure of type data that contains a four element integer array member named x and a 10 element character array member named y.

- One can then declare a structure named record of type data as follows:

```
struct data record;
```

- One can access individual elements of arrays that are structure members using a combination of the member operator and array subscripts :

```
record.x[2] = 100;
record.y[1] = ‘x’;
```

- The character arrays are most frequently used to store strings and the name of an array, without brackets, is a pointer to the array.
- Because this holds true for arrays that are structure members, the expression:

  record.y   is a pointer to the first element of array y[ ] in the structure record.

- Therefore, one could print the contents of y[ ] onscreen using the statement:

```
puts(record.y);
printf("%s",record.y);
```

Example

```
struct data
{       int x[4];
        char y[10];
};

void main()
{  struct data record={{1,2,3,4},"NIELIT";

   printf("x - %d %d %d %d\n", record.x[0],record.x[1],record.x[2],record.x[3]);
   printf("y - %s",record.y)
}
```

Output

```
x - 1 2 3 4
y - NIELIT
```

Arrays of Structures

- After the structure has been defined, one can declare an array as follows:

  struct entry list[1000];

  This statement declares an array named list that contains 1,000 elements.
- Each element is a structure of type entry and is identified by subscript like other array element types.
- Each of these structures has three elements, each of which is an array of type char.
- Structure is used to store the information of One particular object but if we need to store such 100 objects then Array of Structure is used.
- Book structure is used to Store the information of one Book

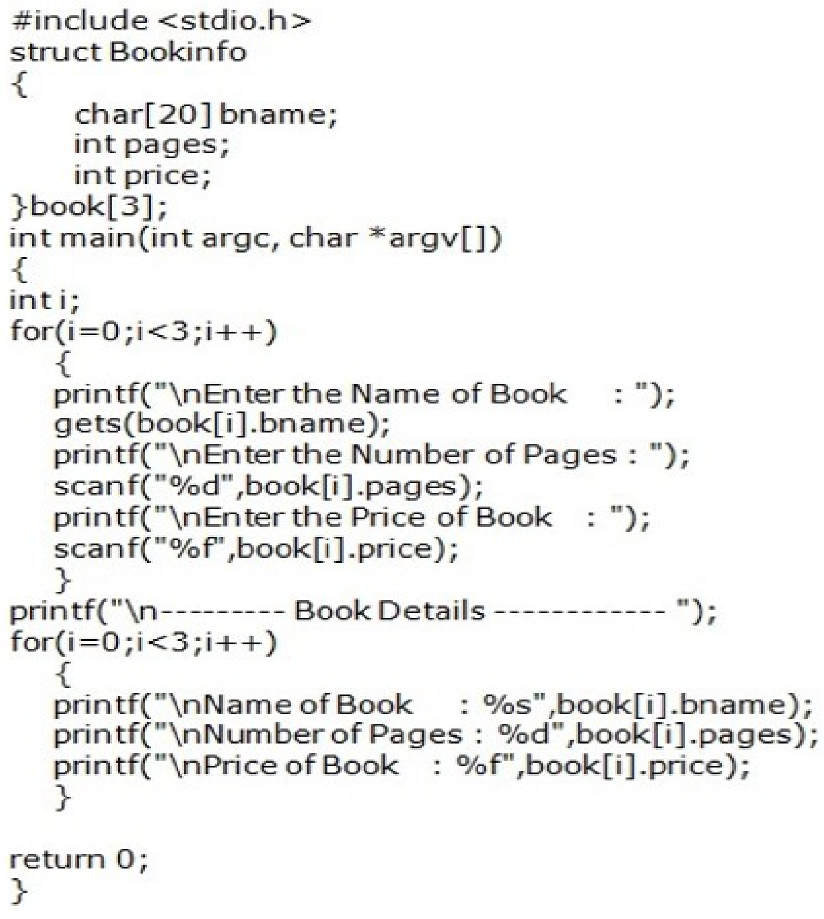
```
struct BookInfo
{   char[20] bname;
    int pages;
    int prince;
 } Book[100];
```

- In case if we need to store the Information of 100 books then Array of Structure is used.
- b1[0] stores the Information of 1st Book , b1[1] stores the information of 2nd Book and So on We can store the information of 100 books.

Initializing Array of Structures

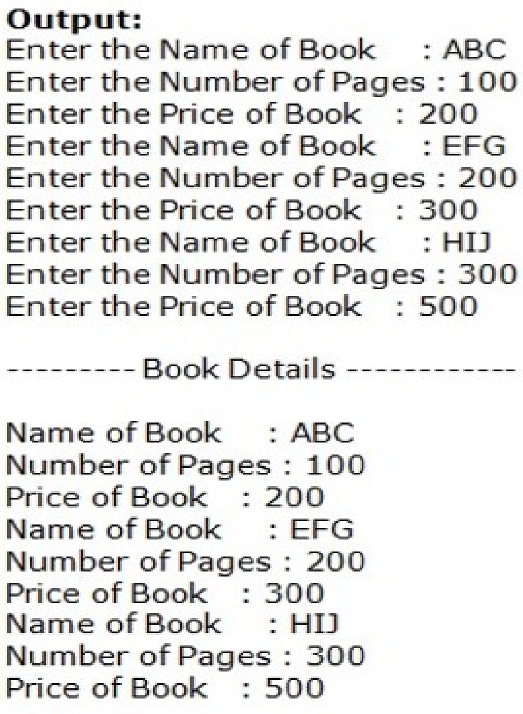
```
struct car
{
   char make[20];
   char model[30];
   int year;
};
struct car arr_car[2] = {
                    {"Audi", "TT", 2016},
                    {"Bentley", "Azure", 2002}
                 };
```

Example



```
#include <stdio.h>
struct Bookinfo
{
      char[20] bname;
      int pages;
      int price;
}book[3];
int main(int argc, char *argv[])
{
int i;
for(i=0;i<3;i++)
    {
    printf("\nEnter the Name of Book     : ");
    gets(book[i].bname);
    printf("\nEnter the Number of Pages : ");
    scanf("%d",book[i].pages);
    printf("\nEnter the Price of Book    : ");
    scanf("%f",book[i].price);
    }
printf("\n--------- Book Details ------------ ");
for(i=0;i<3;i++)
    {
    printf("\nName of Book      : %s",book[i].bname);
    printf("\nNumber of Pages  : %d",book[i].pages);
    printf("\nPrice of Book     : %f",book[i].price);
    }

return 0;
}
```



Output:

```
Enter the Name of Book     : ABC
Enter the Number of Pages : 100
Enter the Price of Book    : 200
Enter the Name of Book     : EFG
Enter the Number of Pages : 200
Enter the Price of Book    : 300
Enter the Name of Book     : HIJ
Enter the Number of Pages : 300
Enter the Price of Book    : 500

--------- Book Details ------------

Name of Book      : ABC
Number of Pages : 100
Price of Book     : 200
Name of Book      : EFG
Number of Pages : 200
Price of Book     : 300
Name of Book      : HIJ
Number of Pages : 300
Price of Book     : 500
```

Example

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

struct studentInfo
{
   char name[20];
   int roll_no;
   float marks;
};

void main()
{
   struct studentInfo st[5];
   int i;

   for(i = 0; i < 5; i++ )
   {
      printf("\nEnter details of student %d\n\n", i+1);

      printf("Enter name: ");
      scanf("%s", st[i].name);

      printf("Enter roll no: ");
      scanf("%d", &st[i].roll_no);

      printf("Enter marks: ");
      scanf("%f", &st[i].marks);
   }

   printf("\n");

   printf("Name\tRoll no\tMarks\n");

   for(i = 0; i < 5; i++ )
   {
      printf("%s\t%d\t%f\n",
      st[i].name, st[i].roll_no, st[i].marks);
   }

}
```