ARRAYS OF STRUCTURES

Arrays of structures means that the structure variable would be an array of objects, each of which contains the member elements declared within the structure construct.

Why would need an array of structures

1. In a class, we do not have just one student. But there may be at least 60 students. So, the same definition of the structure can be used for all the 30 students. This would be possible when we make an array of structures.
2. Another example where an array of structures is desirable is in case of an organization. An organization has a number of employees. So, defining a separate structure for every employee is not a viable solution. So, here we can have a common structure definition for all the employees.

Syntax

```
struct struct_name
{
data_type member_name1;
data_type member_name2;
data_type member_name3;
.....................
};
struct struct_name struct_var[index];
```

```
struct student
{
int r_no;
char name[20];
char course[20];
float fees;
};
```

A student array can be declared by writing,

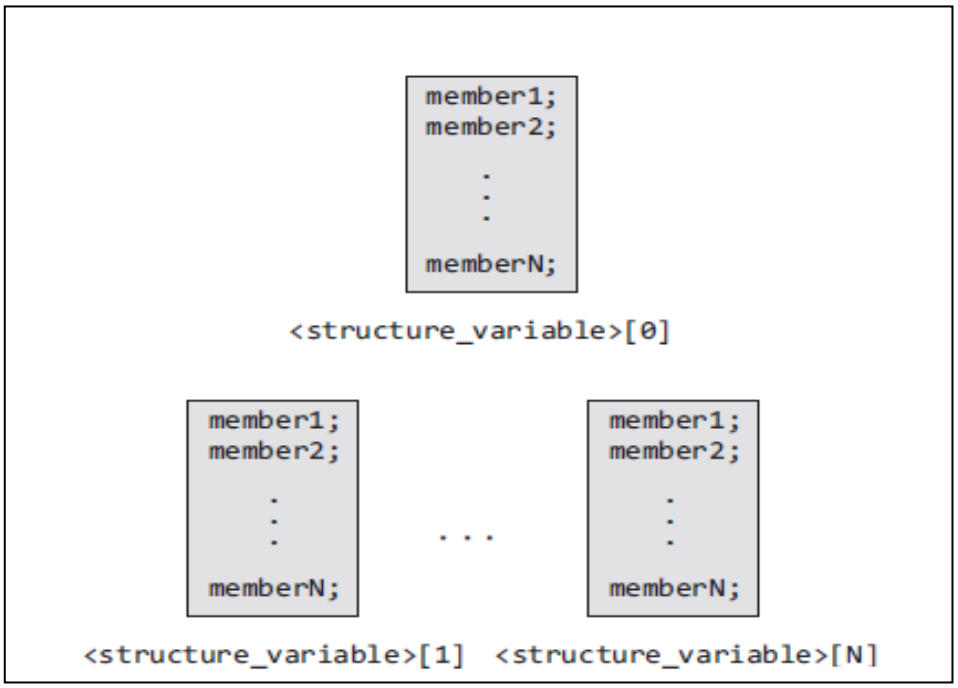
```
struct student stud[30];
```

Now, to assign values to the ith student of the class, we can write as

```
stud[i].r_no = 09;
stud[i].name = "RASHI";
stud[i].course = "MCA";
stud[i].fees = 60000;
```

In order to initialize the array of structure variables

```
struct student stud[3][4] = {{01, "Aman", "BCA", 45000},{02, "Aryan", "BCA", 60000}, {03,"John", "BCA", 45000}};
```



Write a program to print the tickets of the boarders of a boat using array of structures with initialization in the program.

```
#include <stdio.h>

struct boat      // declaration of structure //
{
char name[20];
int     seatnum;
float fare;
};

int main()
{
int i;
struct boat  ticket[4][3]={{“Vikram”,1,15.50},{“Krishna”,2,15.50},
                           {“Ramu”,3,25.50},{“Gouri”,4, 25.50 } };
printf(“\n passenger    Ticket num.    Fare”);
for(i=0;i<=3;i++)
printf(“\n  %s  %d  %f  ”,  ticket[i].name,ticket[i].seatnum,ticket[i].fare);
return 0;
}
```

Output:

Passenger	Ticket num.	Fare
Vikram	1	15.500000
Krishna	2	15.500000
Ramu	3	25.500000
Gouri	4	25.500000

C program to generate salary slip of employees using structures

```
#include<stdio.h>
struct emp
{
   int    empno    ;
   char name[10] ;
   int bpay, allow, ded, npay ;
} e[10] ;

void main()
{
   int i, n ;

   printf("Enter the number of employees : ") ;
   scanf("%d", &n) ;

    for(i = 0 ; i < n ; i++)
   {
      printf("\nEnter the employee number : ") ;
      scanf("%d", &e[i].empno) ;

      printf("\nEnter the name : ") ;
      scanf("%s", e[i].name) ;

      printf("\nEnter the basic pay, allowances & deductions : ") ;scanf("%d
      %d %d", &e[i].bpay, &e[i].allow, &e[i].ded) ;


      e[i].npay = e[i].bpay + e[i].allow - e[i].ded ;
   }
   printf("\nEmp. No.\t Name \t Salary \n") ;
   printf("\n **************************") ;
   for(i = 0 ; i < n ; i++)
   {
      printf("%d \t   %s \t  %f \t ", e[i].empno,e[i].name, e[i].npay) ;
   }
   return 0;
}
```

```
Enter the employee number 2

Enter the employee number: 1001
Enter the employee number: Rina
Enter the basic pay, allowances & deductions: 75000 10000  2000

Enter the employee number: 2001
Enter the employee number: Bina
Enter the basic pay, allowances & deductions: 80000 10000  3000

Emp.No.     Name        NetSalary
**************************
```

1001 Rina 83000
2001 Bina 87000

Write a program to read and display the information of all the students in a class. Then edit the details of the ith student and redisplay the entire information.

```
#include
<stdio.h>
#include
<string.h>
struct student
{
int roll_no;
char
name[80];
int fees;
char DOB[80];
};
int main()
{
struct student
stud[50]; int n, i,
num, new_rollno;
int new_fees;
char new_DOB[80],
new_name[80]; clrscr(); //
clear screen
printf("\n Enter the number of
students : ");scanf("%d", &n);
for(i=0;i<n;i++)
{
printf("\n Enter the roll
number : "); scanf("%d",
&stud[i].roll_no);

printf("\n Enter the
name : ");
gets(stud[i].name);

printf("\n Enter the
fees : ");
scanf("%d",&stud[i].
fees);

printf("\n Enter the
DOB : ");
gets(stud[i].DOB);
}

for(i=0;i<n;i++)
{
```

```
printf("\n ********DETAILS OF STUDENT
%d*******", i+1); printf("\n ROLL No. = %d",
stud[i].roll_no);
printf("\n NAME = %s",
stud[i].name); printf("\n FEES
= %d", stud[i].fees); printf("\n
DOB = %s", stud[i].DOB);
}

printf("\n Enter the student number whose record has to
be edited : ");scanf("%d", &num);

printf("\n Enter the new roll
number : "); scanf("%d",
&new_rolno);

printf("\n Enter the new
name : "):gets(new_name);

printf("\n Enter the new
fees : "); scanf("%d",
&new_fees);
```

```
        printf("\n Enter the new
        DOB : ");gets(new_DOB);

        stud[num].roll_no = new_rollno;
        strcpy(stud[num].name, new_name);
        stud[num].fees = new_fees;
        strcpy (stud[num].DOB, new_DOB);

        for(i=0;i<n;i++)
        {
        printf("\n ********DETAILS OF STUDENT
        %d*******", i+1); printf("\n ROLL No. = %d",
        stud[i].roll_no);
        printf("\n NAME = %s",
        stud[i].name); printf("\n FEES
        = %d", stud[i].fees); printf("\n
        DOB = %s", stud[i].DOB);
        }
  getch();
return 0;
        }
```

Output

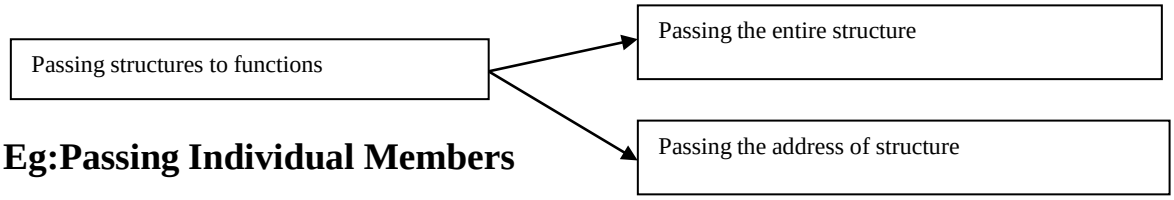
```
Enter the number of students : 2Enter the roll number : 1
Enter the name : kirti Enter the fees : 5678 Enter the DOB : 9-
9- 99

Enter the roll number : 2 Enter the name : kangana Enter the
fees : 5678 Enter the DOB : 27- 8- 99
********DETAILS OF STUDENT 1*******ROLL No. = 1
NAME = kirtiFEES = 5678
DOB = 9- 9- 99
********DETAILS OF STUDENT 2*******ROLL No. = 2
NAME = kanganaFEES = 5678
DOB = 27- 8 -99

Enter the student number whose record has to be edited : 2Enter the new roll number : 2
Enter the new name : kangana khullarEnter the new fees : 7000
Enter the new DOB : 27- 8 -92

********DETAILS OF STUDENT 1*******ROLL No. = 1
NAME = kirtiFEES = 5678
DOB = 9 -9 -99
********DETAILS OF STUDENT 2*******
ROLL No. = 2
NAME = kangana khullarFEES = 7000
DOB = 27- 8 -92
```

STRUCTURES AND FUNCTIONS



Eg:Passing Individual Members

```
#include
<stdio.h>
typedef struct
{
  int
  x;
  int
  y;
}POINT;

void display(int, int);        // function declaration

int main()
{
POINT p1 = {2, 3};
display(p1.x, p1.y); // function call
return 0;
}

void display(int a, int b)     // function definition
{
printf(" The coordinates of the point are: %d %d", a, b);
}
```

Output
The coordinates of the point are: 2 3

Eg:Passing the Entire Structure

```
#include<stdio.h>
typedef struct
      {
int x;
int y;
      }POINT;

      void display(POINT);
      int main()
      {
      POINT p1 = {2, 3};
display(p1);
return 0;
      }
void display(POINT p)
      {
```

```
printf("The coordinates of the point are: %d %d", p.x, p.y);
}
```

- **Passing Structure by Value**
- **Passing Structure by Reference**

Passing Structure by Value

In this approach, the structure object is passed as function argument to the definition offunction, here object is reperesenting the members of structure with their values.

Program

```
#include<stdio.h>

    struct Employee
    {
        int Id;
        char
        Name[25];int
        Age;
        long Salary;
    };

    void Display(struct Employee);

    void main()
    {
        struct      Employee      Emp      =

        {1,"Kumar",29,45000};Display(Emp);

    }

    void Display(struct Employee E)
    {
            printf("\n\nEmployee    Id    :    %d",E.Id);
            printf("\nEmployee  Name  :  %s",E.Name);
            printf("\nEmployee    Age    :    %d",E.Age);
            printf("\nEmployee Salary : %ld",E.Salary);
    }
```

Output
:

```
        Employee  Id  :  1
        Employee  Name  :
        KumarEmployee Age
```

: 29 Employee Salary
: 45000

Passing Structure by Reference

In this approach, the reference/address structure object is passed as function argument to thedefinition of function.

Program

```
#include<stdio.h>

    struct

    Employee
    {
        int Id;
        char
        Name[25];int
        Age;
        long Salary;
    };


    void            Display(struct
    Employee*);void main()
    {
        struct      Employee      Emp      =

        {1,"Kumar",29,45000};Display(&Emp);

    }

    void Display(struct Employee *E)
    {
            printf("\n\nEmployee    Id    :    %d",E->Id);
            printf("\nEmployee  Name  :  %s",E->Name);
            printf("\nEmployee    Age    :    %d",E->Age);
            printf("\nEmployee Salary : %ld",E->Salary)
    }
```

Output :

```
Employee Id:
EmployeeName: Kumar
EmployeeAge:        29
EmployeeSalary : 45000
```