



SNS COLLEGE OF ENGINEERING

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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

COURSE NAME : 23ITT101 Problem solving and C programming

I YEAR /I SEMESTER

Unit 5- Structures and Unions

Topic 4: - Structure within a structure





Nested Structure



- C provides us the feature of nesting one structure within another structure by using which, complex data types are created.
- For example, we may need to store the address of an entity employee in a structure.
- The attribute address may also have the subparts as street number, city, state, and pin code.
- Hence, to store the address of the employee, we need to store the address of the employee into a separate structure and nest the structure address into the structure employee.



Conti...



The structure can be nested in the following ways.

- 1.By separate structure
- 2.By Embedded structure



1) Separate structure



- Two or more separate structures should be declared, but the dependent structure should be used inside the main structure as a member.
- Here, we create two structures, but the dependent structure should be used inside the main structure as a member. Consider the following example.



Example...



```
struct Date
{
    int dd;
    int mm;
    int yyyy;
};
struct Employee
{
    int id;
    char name[20];
    struct Date doj;
}emp1;
```

As you can see, doj (date of joining) is the variable of type Date. Here doj is used as a member in Employee structure. In this way, we can use Date structure in many structures.



Accessing Nested Structure



- We can access the member of the nested structure by **Outer_Structure.Nested_Structure.member** as given below:

Example:

```
emp1.doj.dd;
```

```
emp1.doj.mm;
```

```
emp1.doj.yyyy;
```




Program example



```
#include<stdio.h>
struct address
{
    char city[20];
    int pin;
    char phone[14];
};
struct employee
{
    char name[20];
    struct address add;
};
void main ()
{
    struct employee emp;
    printf("Enter employee information?\n");
    scanf("%s %s %d %s",emp.name,emp.add.city, &emp.add.pin, emp.add.phone);
    printf("Printing the employee information...\n");
    printf("name: %s\nCity: %s\nPincode: %d\nPhone: %s",emp.name,emp.add.city,emp.add.pin,emp.add.phone);
}
```



Output



- Enter employee information?
- Arun
- Delhi
- 110001
- 1234567890

- Printing the employee information....
- name: Arun
- City: Delhi
- Pincode: 110001
- Phone: 1234567890



2) Embedded structure



The embedded structure enables us to declare the structure inside the structure. Hence, it requires less line of codes but it can not be used in multiple data structures.



Example



```
struct Employee
{
    int id;
    char name[20];
    struct Date
    {
        int dd;
        int mm;
        int yyyy;
    }doj;
}emp1;
```



Example



```
#include <stdio.h>
#include <string.h>
struct Employee
{
    int id;
    char name[20];
    struct Date
    {
        int dd;
        int mm;
        int yyyy;
    }doj;
}e1;
```

```
int main( )
{
    //storing employee information
    e1.id=101;
    strcpy(e1.name, "Sonoo Jaiswal");//copying string into char array
    e1.doj.dd=10;
    e1.doj.mm=11;
    e1.doj.yyyy=2014;

    //printing first employee information
    printf( "employee id : %d\n", e1.id);
    printf( "employee name : %s\n", e1.name);
    printf( "employee date of joining (dd/mm/yyyy) : %d/%d/%d\n", e1.doj.dd,e1.doj.mm,e1.doj.yyyy);
    return 0;
}
```



Output



Output:

```
employee id : 101  
employee name : Sonoo Jaiswal  
employee date of joining (dd/mm/yyyy) : 10/11/2014
```



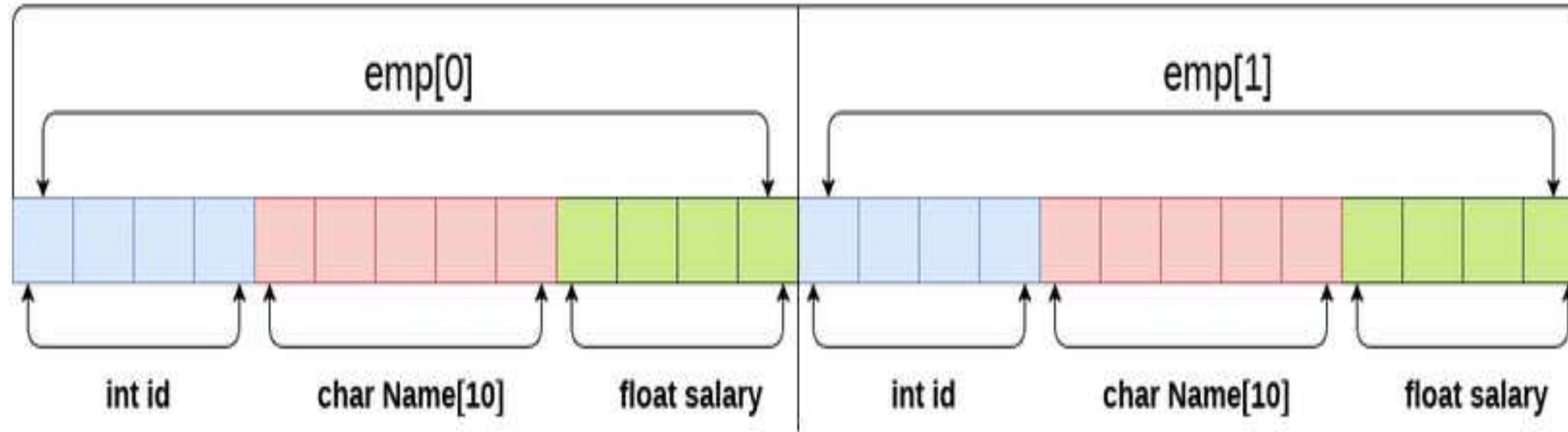
Array of Structures in C



- An array of structures in C can be defined as the collection of multiple structures variables where each variable contains information about different entities.
- The array of structures in C are used to store information about multiple entities of different data types.
- **The array of structures is also known as the collection of structures.**



Array of Structures in C



```
struct employee
{
    int id;
    char name[5];
    float salary;
};
struct employee emp[2];
```

sizeof (emp) = 4 + 5 + 4 = 13 bytes

sizeof (emp[2]) = 26 bytes



Conti...



```
#include<stdio.h>
#include <string.h>
struct student
{
int rollno;
char name[10];
};
int main()
{
int i;
struct student st[5];
```



Conti...



```
printf("Enter Records of 5 students");  
for(i=0;i<5;i++)  
{  
printf("\nEnter Rollno:");  
scanf("%d",&st[i].rollno);  
printf("\nEnter Name:");  
scanf("%s",&st[i].name);  
}
```



Conti...



```
printf("\nStudent Information List:");  
  
for(i=0;i<5;i++)  
{  
    printf("\nRollno:%d, Name:%s",st[i].rollno,st[i].name);  
}  
  
return 0;  
}
```



OUTPUT



- **Enter Records of 5 students**
 - Enter Rollno:1
 - Enter Name:Sonoo
 - Enter Rollno:2
 - Enter Name:Ratan
 - Enter Rollno:3
 - Enter Name:Vimal
 - Enter Rollno:4
 - Enter Name:James
 - Enter Rollno:5
 - Enter Name:Sarfraz
- **Student Information List:**
 - Rollno:1, Name:Sonoo
 - Rollno:2, Name:Ratan
 - Rollno:3, Name:Vimal
 - Rollno:4, Name:James
 - Rollno:5, Name:Sarfraz



Assessment 1



1. What is structure?

Ans : _____

2. Write syntax for structure.

Ans : _____





References



1. Reema Thareja, “Programming in C”, Oxford University Press, Second Edition, 2016

Thank You