Chapter - 6 : Functions

Structures and Functions

In C, structure can be passed to functions by two methods:

- Passing by value (passing actual value as argument).
- Passing by reference (passing address of an argument).

Passing Structure by Value

- A structure variable can be passed to the function as an argument as normal variable.
- If structure is passed by value, change made in structure variable in function definition does not reflect in original structure variable in calling function.

Example

Write a C program to create a structure student, containing name and roll. Ask user the name and roll of a student in main function. Pass this structure to a function and display the information in that function.

```
#include <stdio.h>
struct student
{
    char name[50];
    int roll;
};
void Display(struct student stu);
/* function prototype should be below to the structure declaration otherwise compiler shows error */
int main()
{
    struct student s1;
    printf("Enter student's name: ");
    scanf("%s",s1.name);
    printf("Enter roll number: ");
    scanf("%d",s1.roll);
    Display(s1);  // passing structure variable s1 as argument
    return 0;
}
void Display(struct student stu){
    printf("Output\nName: %s",stu.name);
    printf("Roll: %d",stu.roll);
}

Output
Enter student's name: Kevin Amla
Enter roll number: 149
Output
Name: Kevin Amla
Roll: 149
```
Passing Structure by Reference

- The address location of structure variable is passed to function while passing it by reference.
- If structure is passed by reference, change made in structure variable in function definition reflects in original structure variable in the calling function.

Example

Write a C program to add two distances (feet-inch system) entered by user. To solve this program, make a structure. Pass two structure variable (containing distance in feet and inch) to add function by reference and display the result in main function without returning it.

```c
#include <stdio.h>
struct distance
{
    int feet;
    float inch;
};
void Add(struct distance d1, struct distance d2, struct distance *d3);
int main()
{
    struct distance dist1, dist2, dist3;
    printf("First distance\n");
    printf("Enter feet: ");
    scanf("%d", &dist1.feet);
    printf("Enter inch: ");
    scanf("%f", &dist1.inch);
    printf("Second distance\n");
    printf("Enter feet: ");
    scanf("%d", &dist2.feet);
    printf("Enter inch: ");
    scanf("%f", &dist2.inch);
    Add(dist1, dist2, &dist3);
    /*passing structure variables dist1 and dist2 by value whereas passing structure variable dist3 by reference*/
    printf("\nSum of distances = %d\'-%.1f\", dist3.feet, dist3.inch);
    return 0;
}
void Add(struct distance d1, struct distance d2, struct distance *d3)
{
    /* Adding distances d1 and d2 and storing it in d3 */
    d3->feet=d1.feet+d2.feet;
    d3->inch=d1.inch+d2.inch;
    if (d3->inch >= 12) {   /* if inch is greater or equal to 12, converting it to feet. */
        d3->inch-=12;
        ++d3->feet;
    }
}
```

Output
First distance
Enter feet: 12
Enter inch: 6.8
Second distance
Enter feet: 5
Enter inch: 7.5
Sum of distances = 18'-2.3"
Example

Write a program to read the record of the student and display the student detail.
- Structure of student have the member as name, age and contact_no
- The function display(student) accepts the structure as argument.

```c
#include <stdio.h>

struct student
{
    char name[30];
    int age;
    int contact_no;
};

// function prototype - to display the student detail
void display(struct student s);

void main()
{
    struct student s1;

    printf("Enter name: ");
    gets(s1.name);

    printf("Enter age: ");
    scanf("%d", &s1.age);

    printf("Enter Contact No: ");
    scanf("%d", &s1.contact_no);

    display(s1); // passing struct as an argument
}

void display(struct student s)
{
    printf("nDisplaying information\n");
    printf("Name: %s", s.name);
    printf("Age: %d", s.age);
    printf("Contact No: %d", s.contact_no);
}

Output
Enter name: Ajay
Enter age: 30
Enter Contact No: 456788

Displaying information
Name: Ajay
Age: 30
Contact No: 456788
Example
Write a program to read the record of the student and display the student detail.
- Structure of student have the member as name, age and contact_no
- The function getDetail() reads the student detail and return the student record.

```c
#include <stdio.h>
struct student
{
    char name[30];
    int age;
    int contact_no;
};

// function prototype – to read the student detail and return the student record
struct student getDetail();

void main()
{
    struct student s;

    s = getDetail();

    printf("Displaying information\n");
    printf("Name: %s", s.name);
    printf("Roll: %d", s.age);
    printf("Contact No: %d", s.contact_no);
}

struct student getDetail()
{
    struct student s1;

    printf("Enter name: ");
    gets(s1.name);

    printf("Enter age: ");
    scanf("%d", &s1.age);

    printf("Enter Contact No: ");
    scanf("%d", &s1.contact_no);

    return s1;
}
```