Structure in C

In the C programming language, a structure (or `struct`) is a user-defined data type that allows grouping variables of different data types under a single name. This is particularly useful when you need to represent complex data with different types of attributes, like a person's profile that has both numerical and string data.

Structures help organize data more efficiently, making the program more readable and easier to maintain.

Syntax of Structure in C:

c

```
struct structure_name {
    data_type member1;
    data_type member2;
    // More members
};
```

- `struct`: Keyword used to declare a structure.
- `structure_name`: The name you assign to the structure.
- `member1`, `member2`, etc.: Variables (called "members") that can be of different types.

Example of a Structure in C

Let's say you want to represent information about a student. This information includes:

- Name (string)
- Roll number (integer)
- Marks (float)

Here’s how you can use a structure to store this data in C:

c

```c
#include <stdio.h>
#include <string.h>
// Define the structure
struct Student {
    char name[50];
    int roll_number;
    float marks;
};

int main() {
    // Declare a structure variable
    struct Student student1;

    // Assign values to members of the structure
    strcpy(student1.name, "Alice");
    student1.roll_number = 101;
    student1.marks = 95.5;

    // Access and print structure members
    printf("Name: %s\n", student1.name);
```

```
    printf("Roll Number: %d\n", student1.roll_number);
    printf("Marks: %.2f\n", student1.marks);
    return 0;
}
```

Breakdown of the Example:

1. Structure Definition:

- A `struct Student` is defined, containing three members: `name` (a string), `roll_number` (an integer), and `marks` (a float).

2. Structure Declaration:

- `struct Student student1;` declares a variable `student1` of type `struct Student`.

3. Assigning Values:

- Values are assigned to the structure members using the `.` (dot) operator, for example, `student1.roll_number = 101;`.

4. Accessing and Displaying:

- The members of the structure can be accessed and printed using the dot operator, as shown in `student1.name`, `student1.roll_number`, and `student1.marks`.

Output:

```
Name: Alice
Roll Number: 101
Marks: 95.50
```

Advantages of Using Structures in C:

- Organizes complex data: Structures allow you to group different types of data, which makes it easier to manage.

- Easy to handle: Once defined, structures can be used like built-in types for creating arrays, pointers, or functions that operate on them.

Thus, structures provide a way to model complex data more effectively, offering better organization and readability in programs.