

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

Chapter - 8 : Structures and Unions

The various data types in C Language are

- **Simple Data type:** Integer, Real, Void, Char.
- **Structured Data type:** Array, Strings.
- **User Defined Data type:** Enum, Structures, Unions

Structure Data Type

- A structure is a user defined data type that groups logically related data items of different data types into a single unit.
- All the elements of a structure are stored at contiguous memory locations.
- A variable of structure type can store multiple data items of different data types under the one name.
- As the data of employee in company that is name, Employee ID, salary, address, phone number is stored in structure data type employee_detail.

Defining Structure

A structure has to be defined, before it can be used

Syntax

```
struct <structure name>
{
    Data_type variable_name;
    Data_type variable_name;
    .....
    Data_type variable_name;
};
```

Example

```
struct employee
{
    int temp_id;
    char name[20];
    float address[50];
    char address[50];
    int dept_no;
    int age;
};
```

Application of structure

- Structure is used in database management to maintain data about books in library, items in store, employees in an organization, financial accounting transaction in company.
- Structure is used in C programming for following purposes
 - Clearing screen.
 - Adjusting cursor position.
 - Drawing any graphics shape on the screen.
 - Receiving a key from the keyboard.
 - Finding out the list of equipment attached to the computer.
 - Changing the size of the cursor.
 - Formatting a floppy.
 - Hiding a file from the directory.
 - Displaying the directory of a disk.
 - Checking the memory size.
 - Sending the output to printer.
 - Interacting with the mouse.

Structure Variables

- A structure is a collection of one or more variables grouped under a single name for easy manipulation.
- The variables in a structure, unlike those in an array, can be of different variable types.
- A structure can contain any of C's data types, including arrays and other structures.
- Each variable within a structure is called a member of the structure.

Declaring a Structure Variable

- A structure has to be declared, after the body of structure has been defined.
- The syntax of declaring a structure is

```
struct <struct_name> <variable_name>;
```
- The example to declare the variable for the defined structure "employee".

```
struct employee e1;
```
- Here e1 variable contains 6 members that are defined in structure.

Access data members of a structure

Syntax var_name (dot) member_name;

```
var_name.member1_name;  
var_name.member2_name;
```

Program-1

```
#include <stdio.h>
struct student {
    char name[50];
    int roll;
    float marks;
} s;

void main()
{
    printf("Enter information:\n");
    printf("Enter name: ");
    gets(s.name);

    printf("Enter roll number: ");
    scanf("%d", &s.roll);
    printf("Enter marks: ");
    scanf("%f", &s.marks);

    printf("Displaying Information:\n");
    printf("Name: %s", s.name);
    printf("Roll number: %d\n", s.roll);
    printf("Marks: %f\n", s.marks);
}
```

Program-2

```
#include <stdio.h>
struct student {
    char firstName[20];
    char lastName[20];
    char SSN[10];
    float gpa
};

void main() {
    struct student student_a;

    strcpy(student_a.firstName, "Ram");
    strcpy(student_a.lastName, "Kumar");
    strcpy(student_a.SSN, "2333234");
    student_a.gpa=2009.20;

    printf("First Name: %s\n", student_a.firstName);
    printf("Last Name: %s\n", student_a.lastName);
    printf("SSN: %s\n", student_a.SSN);
    printf("GPA: %f\n", student_a.gpa);
}
```