C Programming

Structures

Nested Structures

Structure templates contain structure members, i.e., the data components of the structure, e.g., int, float, char, int[], char[], etc.,

It is possible to also include another structure as a structure member within a structure template. This is called a *Nested Structure*.

Let's use the previous `student_rec` template and add a nested structure to it as follows …

```
/*
Nested Structures
*/
#include <stdio.h>

#define LENGTH 11
#define S_LENGTH 21
#define SIZE 5

//Structure template(s)
struct date
{
   int day;
   int month;
   int year;
};

struct student_rec
{
   int student_ID;
   char firstname[LENGTH];
   char surname[S_LENGTH];
```

```
   int results[SIZE];
   struct date DOB;
};

// Function signature(s)
// ...


int main()
{
  struct student_rec stu;

  return 0;

} // end main()
```

Here is the full program that uses the above nested structure to enter the Date of Birth for a student_rec variable …

```
/*
Nested Structures
*/
#include <stdio.h>

#define LENGTH 11
#define S_LENGTH 21
#define SIZE 5

//Structure template(s)
struct date
{
   int day;
   int month;
   int year;
};
```

```c
struct student_rec
{
   int student_ID;
   char firstname[LENGTH];
   char surname[S_LENGTH];
   int results[SIZE];
   struct date DOB;
};

// Function signature(s)
// …

int main()
{
   int i;

   struct student_rec stu;

   printf("\nEnter ID:\n");
   scanf("%d", & stu.student_ID);

   // Clear input buffer
   while(getchar() != '\n');

   printf("\nEnter first name:\n");
   fgets(stu.firstname, LENGTH - 1, stdin);

   // Clear input buffer
   while(getchar() != '\n');

   printf("\nEnter surname:\n");
   fgets(stu.surname, S_LENGTH - 1, stdin);

   printf("\nEnter %d results", SIZE);
```

```
    for(i = 0; i < SIZE; i++)
    {
        scanf("%d", & stu.results[i]);
    } // end for

    printf("\nEnter date of birth");
    printf("\n(order: day, month, year)\n");

    scanf("%d", & stu.DOB.day);
    scanf("%d", & stu.DOB.month);
    scanf("%d", & stu.DOB.year);


    // Display data entered into the stu variable
    //
    printf("\nStudent record is:");
    printf("\nID: %d", stu.student_ID);
    printf("\nFirst name: %s", stu.firstname);
    printf("\nSurname: %s", stu.surname);
    printf("\nResults are: ");

    for(i = 0; i < SIZE; i++)
    {
        printf("%d ", stu.results[i]);
    } // end for

    printf("\nDate of Birth:");
    printf("\nDay %d", stu.DOB.day);
    printf("\nMonth %d", stu.DOB.month);
    printf("\nYear %d", stu.DOB.year);

    return 0;

} // end main()
```

Repl 22.1: https://replit.com/@michaelTUDublin/221-Nested-structure#main.c