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| **Ex No: 15** | **Using structures and functions** |

**AIM**

To compute internal marks of students for five different subjects using structures and functions.

**ALGORITHM**

Step 1: Read the number of students (N)  
Step 2: Read the percentage of marks scored in all the internal tests (test1, test2, model) for all five subjects  
Step 3: Calculate the internal marks using the formula (max: 20)  
 internal = (test1 + test2 + model) / (3.0 \* 5)   
Step 4: Display the internal marks for all the subjects

**PRE-LAB QUESTIONS**

1. Define structure in C
2. What are the advantages of unions over structures
3. Differentiate arrays and structures
4. Differentiate static and dynamic memory allocation
5. What is self-referential structure

**PROGRAM**

#include "stdio.h"

#define MAX 10

struct sub**{**

int test1**,** test2**,** model**;**

float internal**;**

**};**

struct stud**{**

int rollno**;**

struct sub subject**[**5**];**

**};**

void getDetails**(**struct stud **\*,** int**);**

void display**(**struct stud **\*,** int**);**

int main**(**void**)** **{**

struct stud student**[**MAX**];**

int N**;**

printf**(**"Number of students (<= %d):"**,** MAX**);**

scanf**(**"%d"**,** **&**N**);**

getDetails**(**student**,** N**);**

display**(**student**,** N**);**

**return** 0**;**

**}**

void getDetails**(**struct stud **\***student**,** int N**)**

**{**

int i**,**j**;**

printf**(**"Enter test1, test2, model marks:\n"**);**

**for(**i**=**0**;** i**<**N**;** i**++)**

**{**

student**[**i**].**rollno **=** i**+**1**;**

printf**(**"\tRollNo: %d \n"**,** student**[**i**].**rollno**);**

**for(**j**=**0**;** j**<**5**;** j**++)**

**{**

printf**(**"subject %d:"**,** j**+**1**);**

scanf**(**"%d"**,** **&**student**[**i**].**subject**[**j**].**test1**);**

scanf**(**"%d"**,** **&**student**[**i**].**subject**[**j**].**test2**);**

scanf**(**"%d"**,** **&**student**[**i**].**subject**[**j**].**model**);**

student**[**i**].**subject**[**j**].**internal **=** **(**student**[**i**].**subject**[**j**].**test1 **+** student**[**i**].**subject**[**j**].**test2 **+** student**[**i**].**subject**[**j**].**model**)/** **(**3.0 **\*** 5**);**

**}** // end inner for-loop

**}**

**}**

void display**(**struct stud **\***student**,** int N**)**

**{**

int i**,**j**;**

printf**(**"\n\n\t\t Marks statement\n"**);**

printf**(**"Subject\t Test1\t Test2\t Model\t Internal\n"**);**

printf**(**"\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\n"**);**

**for(**i**=**0**;** i**<**N**;** i**++)**

**{**

printf**(**"Roll No %d\n"**,** student**[**i**].**rollno**);**

**for(**j**=**0**;** j**<**5**;** j**++)**

**{**

printf**(**"%d\t"**,**j**+**1**);**

printf**(**"%d\t"**,**student**[**i**].**subject**[**j**].**test1**);**

printf**(**"%d\t"**,**student**[**i**].**subject**[**j**].**test2**);**

printf**(**"%d\t"**,**student**[**i**].**subject**[**j**].**model**);**

printf**(**"%.0f\n"**,**student**[**i**].**subject**[**j**].**internal**);**

**}**

**}**

**}**

**INPUT**

Number of students (<= 10): 2

Enter test1, test2, model marks:

RollNo: 1

subject 1: 56 67 78

subject 2: 67 89 66

subject 3: 34 56 78

subject 4: 77 88 56

subject 5: 67 77 94

RollNo: 2

subject 1: 77 88 90

subject 2: 56 67 70

subject 3: 45 77 88

subject 4: 78 34 78

subject 5: 77 88 86

**OUTPUT**

Marks statement

Subject Test1 Test2 Model Internal

\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*

Roll No 1

1 56 67 78 13

2 67 89 66 15

3 34 56 78 11

4 77 88 56 15

5 67 77 94 16

Roll No 2

1 77 88 90 17

2 56 67 70 13

3 45 77 88 14

4 78 34 78 13

5 77 88 86 17

**POST-LAB QUESTIONS**

1. Illustrate the self referential structure with example
2. Illustrate the dynamic memory allocation for a structure with example

**RESULT**

Thus the C program to generate salary slip of employees using structures and pointers was successfully written and executed.