Assignment 2

To Create a structure to specify data on students as given below: Roll number, Name, Department, Course, and Year of joining. Assume that there are not more than 450 students in the collage. (a) Write a function to print the names of all students who joined in the last 3 years. (b) Write a function to print the data of a student whose roll numbers are divisible by 4.

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Contents :-

Problem Statement :-

We need to store the student data such as name , department , branch , year of joining etc. with the help of structures in c programming language.

Introduction :-

In this project since we want to store multiple variables for a given student, we would make use of data type called structure. After making a struct we initialize a dynamic array which would have this structure as its data type so that a we can store data of 450 students without making the code too lengthy or initializing too many variables. Now since this array is dynamic, we would make use of pointers in order to access different elements in this array.

Procedure:-

1. First we store different type of variables in student_ info function with the help of “ struct “ data type.
2. Now we have take the inputs of student with the help of do while loop.
3. We have use the “ %*c[\^n] “ to clear the buffer.
4. Now we have initialise two functions which will be recall later.
5. Now we have call all the function in the main function.

Algorithms :-

Step 1 :- First we need to define a structure to store information of the student.

```c
#include <stdio.h>
struct student_info
{

    //^ here roll number cannot be negative and can be only between 0 to 450.
    unsigned short int roll_number;

    //^ according to international standards name should not exceed 25 charecters.
    char name[25], department[25], course[25];

    //^ year of join is small number so use unsigned short int.
    unsigned short int year;
};
```

Step2 :-Now we have declared two functions with the argument of a struct data type pointer.

```
15   void names_of_prev_3yrs_students(struct student_info *);
16
17   void data_of_student_whose_roll_is_divisible_by_4(struct student_info *);
```

Step 3 :- we started the main function in which we first made use of do while loop to store the number of students the end user want to input.

```
19  int main()
20  {
21      unsigned short int no_of_students;
22      do
23      {
24          printf("Enter the number of students studying in the college : ");
25          scanf("%hu", &no_of_students);
26      } while (no_of_students <= 0 || no_of_students > 450);
27      //~ As per the question students are not more than 450 and students can't be 0.
```

Step 5 :- Now we dynamically initialize the structure and initialize the pointer to the structure .

```
29      struct student_info student[no_of_students], *ptr;
30      //~ dynamic initialization of structures.
31
32      ptr = student;
33      //~initializing the pointer to the structure.
34
```

Step 5 :- our next step is to take input of data of the ‘n’ students and we can do that by using a for loop.

```
35      //~ taking input of all the students.
36      for (unsigned short int i = 0; i < no_of_students; i++)
37      {
38          do
39          {
40              printf("Enter the roll number of student %hu : ", i + 1);
41              scanf("%hu", &student[i].roll_number);
42          } while (student[i].roll_number <= 0 || student[i].roll_number > 450);
43          //~ As per the question students are not more than 450 and students can't be 0.
44
45          printf("Enter the name of student %hu : ", i + 1);
46          scanf("%*c%[^\n]", student[i].name);
47          //~ As to take space seperated names as input we use "%[^\n]".
48
49          printf("Enter the department of student %hu : ", i + 1);
50          scanf("%*c%[^\n]", student[i].department);
51          //~ As to take space seperated names as input we use "%[^\n]".
52
53          printf("Enter the course of student %hu : ", i + 1);
54          scanf("%*c%[^\n]", student[i].course);
55          //~ As to take space seperated names as input we use "%[^\n]".
56
```

```
56
57          do
58          {
59              printf("Enter the joining year of student %hu : ", i + 1);
60              scanf("%hu", &student[i].year);
61          } while (student[i].year > 2021);
62          //~ this is the maximum number of years in which a student can complete his/her b-tech.
63      }
64      printf("\n\nNames of the students who joined in past 3 years are given below:-\n\n");
65      for (unsigned short int i = 0; i < no_of_students; i++, ptr++)
66      {
67          names_of_prev_3yrs_students(ptr);
68          //~sending data in the form of pointer to reduce memory allocation.
69      }
70
71      ptr = student;
72      //~reinitializing the pointer to the structure.
73      printf("\n\nData of the Students whose Roll No. is divisible by 4 are given below:-\n\n");
74      for (unsigned short int i = 0; i < no_of_students; i++, ptr++)
75      {
76          data_of_student_whose_roll_is_divisible_by_4(ptr);
77      }
78
79      return 0;
80  }
81
```

Step 6 :- Printing the name of students who joined in past 3 years and data of students whose roll no. is divisible by four.

```
76      printf("\n\nNames of the students who joined in past 3 years are given below:-\n\n");
77      for (unsigned short int i = 0; i < no_of_students; i++, ptr++)
78      {
79          names_of_prev_3yrs_students(ptr);
80          //~sending data in the form of pointer to reduce memory allocation.
81      }
82
83      ptr = student;
84      //~reinitializing the pointer to the structure.
85      printf("\n\nData of the Students whose Roll No. is divisible by 4 are given below:-\n\n");
86      for (unsigned short int i = 0; i < no_of_students; i++, ptr++)
87      {
88          data_of_student_whose_roll_is_divisible_by_4(ptr);
89      }
90
91      return 0;
92  }
```

Step 7 :- Function for printing the names of the students joined in past 3 years.

```
95   void names_of_prev_3yrs_students(struct student_info *pointer)
96   {
97
98       if ((*pointer).year >= 2019)
99       {
100          printf("%s\n", (*pointer).name);
101      }
```

Step 8:- Function for printing all the data of the student whose roll number is divisible by 4.

```
103  void data_of_student_whose_roll_is_divisible_by_4(struct student_info *pointer)
104  {
105
106      if ((*pointer).roll_number % 4 == 0)
107      {
108          printf("Roll number : %hu\n", (*pointer).roll_number);
109          printf("Name : %s\n", (*pointer).name);
110          printf("Department : %s\n", (*pointer).department);
111          printf("Course : %s\n", (*pointer).course);
112          printf("Year : %hu\n\n", (*pointer).year);
113      }
114  }
115
```

Problems faced :-

The above programme is good but we have find some difficulty in use of pointer.

Time Complexity For each Steps:-

As we have only use the single loops in the whole code so the whole time complexity of code is O(n).

Conclusion:-

```
Enter the number of students studying in the college : 4
Enter the roll number of student 1 : 24
Enter the name of student 1 : Sree vardhan
Enter the department of student 1 : ECE
Enter the course of student 1 : LAL
Enter the joining year of student 1 : 2020
Enter the roll number of student 2 : 62
Enter the name of student 2 : pranav ti war i
Enter the department of student 2 : bio - tech
Enter the course of student 2 : PHY
Enter the joining year of student 2 : 2020
Enter the roll number of student 3 : 44
Enter the name of student 3 : ram santhosh
Enter the department of student 3 : ECE
Enter the course of student 3 : hello
Enter the joining year of student 3 : 2020
Enter the roll number of student 4 : 24
Enter the name of student 4 : lkjsdjlksdf
Enter the department of student 4 : ECE
Enter the course of student 4 : mech
Enter the joining year of student 4 : 2019
```

```
Names of the students who joined in past 3 years are given below:-

Sree vardhan
pranav ti war i
ram santhosh
lkjsdjlksdf


Data of the Students whose Roll No. is divisible by 4 are given below:-

Roll number : 24
Name : Sree vardhan
Department : ECE
Course : LAL
Year : 2020

Roll number : 44
Name : ram santhosh
Department : ECE
Course : hello
```

```
Data of the Students whose Roll No. is divisible by 4 are given below:-

Roll number : 24
Name : Sree vardhan
Department : ECE
Course : LAL
Year : 2020

Roll number : 44
Name : ram santhosh
Department : ECE
Course : hello
Year : 2020

Roll number : 24
Name : lkjsdjlksdf
Department : ECE
Course : mech
Year : 2019
```

Reference :-

https://www.quora.com/What-does-scanf-n-c-name-mean

(%[^\n]%*c)

Thank You