**C Programming**

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**Question 1: Create a program to manage student records.**

**It should:**

* Use a struct to store: roll number, name, marks (array of 3 subjects), and average.
* Dynamically allocate memory for N students using malloc() Calculate average marks.
* Store all student data into a file(students.txt) using printf() then, read and display data from the file using scanf()

**Key concepts used:**

Structure, array, dynamic memory allocation file handling string handing.

**Code:**

#include <stdio.h>

#include <stdlib.h>

#include <string.h>

#define SUBJECTS 3

#define NAME\_LEN 100

struct Student {

int roll;

char name[NAME\_LEN];

float marks[SUBJECTS];

float average;

};

int main() {

int n;

printf("Enter number of students: ");

scanf("%d", &n);

struct Student\* students = (struct Student\*) malloc(n \* sizeof(struct Student));

if (students == NULL) {

printf("Memory allocation failed.\n");

return 1;

}

for (int i = 0; i < n; i++) {

printf("\n--- Enter details for student %d ---\n", i + 1);

printf("Roll number: ");

scanf("%d", &students[i].roll);

printf("Name: ");

getchar();

fgets(students[i].name, NAME\_LEN, stdin);

students[i].name[strcspn(students[i].name, "\n")] = '\0';

float total = 0;

for (int j = 0; j < SUBJECTS; j++) {

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

scanf("%f", &students[i].marks[j]);

total += students[i].marks[j];

}

students[i].average = total / SUBJECTS;

}

FILE\* fptr = fopen("students.txt", "w");

if (fptr == NULL) {

printf("File could not be opened for writing.\n");

free(students);

return 1;

}

for (int i = 0; i < n; i++) {

fprintf(fptr, "%d %s %.2f %.2f %.2f %.2f\n",

students[i].roll,

students[i].name,

students[i].marks[0],

students[i].marks[1],

students[i].marks[2],

students[i].average

);

}

fclose(fptr);

free(students);

printf("\n--- Student Records from File ---\n");

struct Student temp;

FILE\* rptr = fopen("students.txt", "r");

if (rptr == NULL) {

printf("File could not be opened for reading.\n");

return 1;

}

while (fscanf(rptr, "%d %s %f %f %f %f",

&temp.roll,

temp.name,

&temp.marks[0],

&temp.marks[1],

&temp.marks[2],

&temp.average) == 6) {

printf("\nRoll: %d\nName: %s\nMarks: %.2f, %.2f, %.2f\nAverage: %.2f\n",

temp.roll,

temp.name,

temp.marks[0],

temp.marks[1],

temp.marks[2],

temp.average

);

}

fclose(rptr);

return 0;

}

**Question 2: Move zeros to the end of the array Given n array move all zero elements to the end without changing the relative order of non zero elements.**

**Code:**

#include <stdio.h>

void moveZerosToEnd(int arr[], int n) {

int index = 0;

for (int i = 0; i < n; i++) {

if (arr[i] != 0) {

arr[index++] = arr[i];

}

}

while (index < n) {

arr[index++] = 0;

}

}

int main() {

int arr[100], n;

printf("Enter size of array: ");

scanf("%d", &n);

printf("Enter %d elements:\n", n);

for (int i = 0; i < n; i++) {

scanf("%d", &arr[i]);

}

moveZerosToEnd(arr, n);

printf("Array after moving zeros to the end:\n");

for (int i = 0; i < n; i++) {

printf("%d ", arr[i]);

}

return 0;

}