***REHEMA HOPE MUMBI***

***SCT212-0144/2022***

***ICS 2105***

***DATA STRUCTURES AND ALGORITHMS***

**LAB ONE**

***Task One (1)***

#include <iostream>

int summation(int arr[], int n)

{

int sum = 0;

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

sum = sum + arr[i];

}

return sum;

}

int maximum(int arr[], int n)

{

int max = arr[0];

for (int i = 1; i < n; ++i) {

if (arr[i] > max) {

max = arr[i];

}

}

return max;

}

int main() {

int n;

std::cout << "Enter the number of integers (n): ";

std::cin >> n;

int arr[n];

std::cout << "Enter " << n << " integers:" << std::endl;

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

std::cin >> arr[i];

}

std::cout << "Sum: " << summation(arr, n) << std::endl;

std::cout << "Maximum: " << maximum(arr, n) << std::endl;

return 0;

}

***Task two***

#include <iostream>

#include <cmath>

using namespace std;

struct student {

string regno;

string name;

int Age;

string registered[5];

string course;

string course\_id;

int unitmarks[5];

};

void getData(student &s) {

cout << "Reg no: ";

cin >> s.regno;

cout << "Student name: ";

cin >> s.name;

cout << "Student age: ";

cin >> s.Age;

cout << "Course: ";

cin >> s.course;

cout << "Course id: ";

cin >> s.course\_id;

cout << "Number of courses: ";

int num\_Course;

cin >> num\_Course;

for (int i = 0; i < num\_Course; i++) {

cout << "Enter unit " << i + 1 << " name: ";

cin >> s.registered[i]; // corrected: store unit name in registered array

cout << "Enter mark " << i + 1 << ": ";

cin >> s.unitmarks[i];

}

}

float calculateAverage(student &s) {

int sum = 0;

float count = 0;

for (int i = 0; i < 5; i++) {

if (!s.registered[i].empty()) {

sum += s.unitmarks[i];

count++;

}

}

if (count > 0) {

return static\_cast<float>(sum) / count;

} else {

return 0.0; // return 0 if no units are registered

}

}

string computeGrade(float avg) {

if (avg >= 70.0) {

return "A";

} else if (avg >= 60.0) {

return "B";

} else if (avg >= 50.0) {

return "C";

} else if (avg >= 40.0) {

return "D";

} else {

return "E";

}

}

int main() {

student students[5];

for (int i = 0; i < 5; i++) {

cout << "Enter details for student " << i + 1 << ":\n";

getData(students[i]);

}

// Display student details, add marks, and compute grades

for (int i = 0; i < 5; i++) {

cout << "\nDetails for student " << i + 1 << ":\n";

cout << "Reg no: " << students[i].regno << "\n";

cout << "Student name: " << students[i].name << "\n";

cout << "Student age: " << students[i].Age << "\n";

cout << "Course: " << students[i].course << "\n";

cout << "Course id: " << students[i].course\_id << "\n";

// Add marks

cout << "Adding marks for student " << i + 1 << ":\n";

getData(students[i]);

// Calculate average and compute grade

float avg = calculateAverage(students[i]);

string grade = computeGrade(avg);

cout << "Average marks: " << avg << "\n";

cout << "Grade: " << grade << "\n";

}

return 0;

}

***Task three***

#include <iostream>

#include <string>

class Student {

private:

std::string regno;

std::string name;

int age;

std::string registered[5];

std::string course;

std::string course\_id;

int unitmarks[5];

public:

void getData() {

std::cout << "Reg no: ";

std::cin >> regno;

std::cout << "Student name: ";

std::cin >> name;

std::cout << "Student age: ";

std::cin >> age;

std::cout << "Course: ";

std::cin >> course;

std::cout << "Course id: ";

std::cin >> course\_id;

std::cout << "Number of courses: ";

int num\_Course;

std::cin >> num\_Course;

for (int i = 0; i < num\_Course; i++) {

std::cout << "Enter unit " << i + 1 << " name: ";

std::cin >> registered[i];

std::cout << "Enter mark " << i + 1 << ": ";

std::cin >> unitmarks[i];

}

}

float calculateAverage() {

int sum = 0;

float count = 0;

for (int i = 0; i < 5; i++) {

if (!registered[i].empty()) {

sum += unitmarks[i];

count++;

}

}

if (count > 0) {

return static\_cast<float>(sum) / count;

} else {

return 0.0; // return 0 if no units are registered

}

}

std::string computeGrade(float avg) {

if (avg >= 70.0) {

return "A";

} else if (avg >= 60.0) {

return "B";

} else if (avg >= 50.0) {

return "C";

} else if (avg >= 40.0) {

return "D";

} else {

return "E";

}

}

void displayDetails() {

std::cout << "\nDetails for student:\n";

std::cout << "Reg no: " << regno << "\n";

std::cout << "Student name: " << name << "\n";

std::cout << "Student age: " << age << "\n";

std::cout << "Course: " << course << "\n";

std::cout << "Course id: " << course\_id << "\n";

}

void addMarks() {

std::cout << "Adding marks:\n";

getData();

}

};

int main() {

Student students[5];

for (int i = 0; i < 5; i++) {

std::cout << "Enter details for student " << i + 1 << ":\n";

students[i].getData();

}

// Display student details, add marks, and compute grades

for (int i = 0; i < 5; i++) {

students[i].displayDetails();

students[i].addMarks();

// Calculate average and compute grade

float avg = students[i].calculateAverage();

std::string grade = students[i].computeGrade(avg);

std::cout << "Average marks: " << avg << "\n";

std::cout << "Grade: " << grade << "\n";

}

return 0;

}

***Task four***

