

➤ NESTED Struct example code

```
/// Exercise no 2

#include <iostream>
#include <string>
using namespace std;

// FacultyMember struct copy from Previous Exercise
struct FacultyMember
{
    int ID;
    string First_Name;
    string Last_Name;
    string designation;
};

// University struct
struct University
{
    string name;
    string address;
    FacultyMember *facultyMembers=new FacultyMember[3];
};

// Function to input values for a FacultyMember
void newrecord(FacultyMember& fm)
{
    cout << "Enter ID: ";
    cin >> fm.ID;
    cout << "Enter first name: ";
    cin >> fm.First_Name;
    cout << "Enter last name: ";
    cin >> fm.Last_Name;
    cout << "Enter designation: ";
    cin >> fm.designation;
}

// Function to print details of a FacultyMember
void printdetails(FacultyMember fm)
{
    cout << "ID: " << fm.ID << endl;
    cout << "Name: " << fm.First_Name << " " << fm.Last_Name << endl;
    cout << "Designation: " << fm.designation << endl;
}

// Function to sort an array of FacultyMember by ID
void sortid(FacultyMember fm[], int size)
{
    for (int i = 0; i < size - 1; i++)
    {
        for (int j = 0; j < size - i ; j++)
        {
            if (fm[j].ID > fm[j + 1].ID)
            {
                FacultyMember temp = fm[j];
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        fm[j] = fm[j + 1];
        fm[j + 1] = temp;
    }
}
}

int main()
{
    // Declare and initialize University variable
    University myUni;
    myUni.name = "National University Of Computer and Emerging Sciences";
    myUni.address = "Block-B, Faisal Town";

    // Input values for FacultyMembers

    for (int i = 0; i < 3; i++)
    {
        cout << "Enter details for faculty member " << i + 1 << ":" << endl;
        newrecord(myUni.facultyMembers[i]);
    }

    // Sort facultyMembers array by ID
    sortid(myUni.facultyMembers, 3);

    // Print details of the University
    cout << "University Name: " << myUni.name << endl;
    cout << "Address: " << myUni.address << endl;
    cout << "Faculty Members:" << endl;
    for (int i = 0; i < 3; i++)
    {
        cout << "Faculty Member " << i + 1 << ":" << endl;
        printdetails(myUni.facultyMembers[i]);
    }

    return 0;
}

```

➤ Example 2

```

#include<iostream>
using namespace std;
//structure Book definition
struct Book
{
    //variable declarations
    int bookCode;
    string bookName;
    string subject;
    double price;
}

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    int edition;
};
//structure Author declaration
struct Author
{
    //variable declaration
    int ID;
    string name;
    //an array of three books
    struct Book b[3];
};
int main()
{
    //declare Author pointer named author and Author variable auth
    struct Author *author,auth;
    //assign address of auth into pointer author
    author=&auth;
    //prompt user to enter ID
    cout<<"Enter author's ID: ";
    //read ID
    cin>>author->ID;
    cin.ignore();
    //prompt user to enter name
    cout<<"Enter author's name: ";
    //read name
    getline(cin,author->name);
    cout<<"Enter details of three books.."<<endl;
    //for loop to read three book details
    for(int i=0;i<3;i++)
    {
        cout<<"Enter book"<<i+1<<" details.."<<endl;
        //prompt user to enter book code
        cout<<"Book Code: ";
        //read bookCode
        cin>>author->b[i].bookCode;
        cin.ignore();
        //prompt user to enter book name
        cout<<"Book Name: ";
        //read book name
        getline(cin,author->b[i].bookName);
        //prompt user to enter subject
        cout<<"Subject: ";
        //read subject
        getline(cin,author->b[i].subject);
        //prompt user to enter price
    }
}

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        cout<<"Price: ";
        //read author
        cin>>author->b[i].price;
        //prompt user to enter edition
        cout<<"Edition: ";
        //read edition
        cin>>author->b[i].edition;
    }
    //display details of author
    cout<<"\n\nDetails of author..."<<endl;
    cout<<"Author's ID: "<<author->ID<<endl;
    cout<<"Author's Name: "<<author->name<<endl;
    cout<<"Book details..."<<endl;
    //for loop to display three book details
    for(int i=0;i<3;i++)
    {
        //display book's details
        cout<<"\nBook"<<i+1<<" details.."<<endl;
        cout<<"Book Code: "<<author->b[i].bookCode<<endl;
        cout<<"Book Name: "<<author->b[i].bookName<<endl;
        cout<<"Subject: "<<author->b[i].subject<<endl;
        cout<<"Price: $"<<author->b[i].price<<endl;
        cout<<"Edition: "<<author->b[i].edition<<endl;
    }
    return 0;
}

```

➤ Example 3

```

#include <iostream>
#include <string>
using namespace std;
struct Date
{
    int day;
    int month;
    int year;
};
struct Student
{
    float cgpa;
    string name;
    string rollnumber;
}

```

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    Date dob;
    int numCrs;
    int * crsCodes;
};

void DisplayDate(Date s)
{
    cout<<s.day<<"-"<<s.month<<"-"<<s.year<<endl;
}

void DisplayStudent(Student s)
{
    cout<<"Displaying Student data"<<endl;
    cout<<s.rollnumber<<" "<<s.name<<" "<<s.cgpa<<endl;
    DisplayDate(s.dob);
    //cout<<s.dob.day<<"-"<<s.dob.month<<"-"<<s.dob.year<<endl;
    for(int i=0; i<s.numCrs; i++)
        cout<<s.crsCodes[i]<<endl;
}

Student returnStudent()
{
    Student a;
    cout<<"Enter cgpa"<<endl;
    cin>>a.cgpa;
    a.rollnumber="23L-1112";
    a.name="hghh";
    a.dob.day=3; a.dob.month=3; a.dob.year=2002;
    a.numCrs=2;
    a.crsCodes= new int[a.numCrs];
    cout<<"Please enter 2 course codes"<<endl;
    for(int i=0; i<a.numCrs; i++)
        cin>>a.crsCodes[i];
    return a;
}

int main ()
{
    int numStd;
    cin>>numStd;
    Student *s1= new Student[numStd];
    for(int i=0; i<numStd;i++)
    {
        s1[i]=returnStudent();
    }
    for(int i=0; i<numStd;i++)
    {

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        DisplayStudent(s1[i]);
    }

    delete [] s1;
    return 0;
}

```

➤ Structs and filling Example

```

#include<iostream>
#include<fstream>
using namespace std;

// struct phnum
struct phnum
{
    // variables to store 3-digit areaCode and
    // 4-digit PhoneNumber
    string areaCode;
    string PhoneNumber;
};

// function taking input and output file streams as arguments
// and converts the Phone number from input file to the phone
// number in required format in output file
void fun(ifstream &inpf,ofstream &outf)
{
    phnum temp;
    string line;

    // now reading phone numbers from phnum.txt file
    while(!inpf.eof())
    {
        getline(inpf,line);

        // extracting 3-digit areaCode and 4-digit PhoneNumber
        temp.areaCode=line.substr(0,3);
        temp.PhoneNumber=line.substr(4);

        string output=temp.areaCode+temp.PhoneNumber;

        // writing the output to outFile.txt file
        outf<<output<<endl;
    }
}

```

```
}  
  
int main()  
{  
    // declaring input and output file streams  
    ifstream inpf;  
    inpf.open("phnum.txt");  
    ofstream outf;  
    outf.open("outFile.txt");  
  
    // calling function fun()  
    fun(inpf,outf);  
  
    inpf.close();  
    outf.close();  
  
    return 0;  
}
```