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20220040

Cycle 3 Program 7

Aim: To write a program to create a class STUDENT with age name and register number and derive 2 classes M Tech stud, B Tech stud from it and list the students according to their marks and gpa respectively. Also implement sort as a virtual function.

```cpp
#include<iostream>
#include<string.h>
using namespace std;

class Student{
    protected:
    int age,reg_no;
    char name[20];
    public:
        Student(){

            age=0;
            reg_no=0;
        }

        Student(char name[20],int age,int reg_no){
            strcpy(this->name,name);
            this->age=age;
            this->reg_no=reg_no;
        }

        void setDate(){
            cin.ignore();
            cout<<"Enter name: ";
            cin.get(name,20,'\n');
            cout<<"Enter age: ";
            cin>>age;
            cout<<"Enter register number: ";
            cin>>reg_no;
        }

        virtual void sort(int n)=0;

};

class MTechStud:public Student{
    int gpa;
    public:

        MTechStud(){
            gpa=0;
        }
```

```cpp
        MTechStud(int gpa,char name[20],int age,int
reg_no):Student(name,age,reg_no){
            this->gpa=gpa;
            strcpy(this->name,name);
            this->age=age;
            this->reg_no=reg_no;
        }

        void setGpa(){
            setDate();
            cout<<"Enter Gpa: ";
            cin>>gpa;
        }
        void sort(int n){
            for (int i=0; i<n-1; i++) {
                for (int j=0; j<n-i-1;j++){
                    if (this[j].gpa > this[j + 1].gpa) {
                        MTechStud temp = this[j];
                        this[j] = this[j + 1];
                        this[j + 1] = temp;
                    }
                    if(this[j].gpa == this[j+1].gpa){
                        if(strcmp(this[j].name,this[j+1].name) > 0){
                            MTechStud temp = this[j];
                            this[j] = this[j + 1];
                            this[j + 1] = temp;
                        }
                    }
                }
            }
        }
        void display(){
            cout << "Name: " << name << endl;
            cout << "Age: " << age << endl;
            cout << "Reg No.: " << reg_no << endl;
            cout << "GPA: " << gpa << endl << endl;
        }
};

class BTechStud:public Student{
    int mark;
    public:
        BTechStud(){
            mark=0;
        }
        BTechStud(int mark,char name[20],int age,int
reg_no):Student(name,age,reg_no){
```

```cpp
            this->mark=mark;
            strcpy(this->name,name);
            this->age=age;
            this->reg_no=reg_no;
        }
        void setMark(){
            setDate();
            cout<<"Enter mark: ";
            cin>>mark;
        }

        void sort(int n){
            for (int i=0; i<n-1; i++) {
                for (int j=0; j<n-i-1;j++){
                    if (this[j].mark > this[j + 1].mark) {
                        BTechStud temp = this[j];
                        this[j] = this[j + 1];
                        this[j + 1] = temp;
                    }
                    else if(this[j].mark == this[j+1].mark){
                        if(strcmp(this[j].name,this[j+1].name) > 0){
                            BTechStud temp = this[j];
                            this[j] = this[j + 1];
                            this[j + 1] = temp;
                        }
                    }
                }
            }
        }

        void display(){
            cout << "Name: " << name << endl;
            cout << "Age: " << age << endl;
            cout << "Reg No.: " << reg_no << endl;
            cout << "Marks: " << mark << endl << endl;
        }
};

int main(){
    int n=0,choice=0;
    BTechStud bs[100];
    MTechStud ms[100];
    Student *s;
    s=bs;
    cout<<endl<<"Select Course: "<<endl<<"1. Btech"<<endl<<"2.
MTech"<<endl<<"Enter choice: ";
    cin>>choice;
    switch (choice){
```

```
        case 1:
            cout<<"Enter no. of Btech Students: ";
            cin>>n;
            for(int i=0;i<n;i++){
                cout<<"------BTech Student "<<i+1<<"--------"<<endl;
                bs[i].setMark();
            }
            s->sort(n);
            for(int i=0;i<n;i++){
                cout<<"------BTech Student "<<i+1<<"--------"<<endl;
                bs[i].display();
            }
            break;
        case 2:
            cout<<"Enter no. of Mtech Students: ";
            cin>>n;
            s=ms;
            for(int i=0;i<n;i++){
                cout<<"------MTech Student "<<i+1<<"--------"<<endl;
                ms[i].setGpa();
            }
            s->sort(n);
            for(int i=0;i<n;i++){
                cout<<"------MTech Student "<<i+1<<"--------"<<endl;
                ms[i].display();
            }
            break;
        default:
            cout<<"Some error occured";
            break;
    }



}
```

Sample Input/Output:

1.

```
Select Course:
1. Btech
2. MTech
Enter choice: 1
Enter no. of Btech Students: 4
------BTech Student 1--------
Enter name: Rohit
Enter age: 20
```

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```
Enter register number: 234
Enter mark: 55
------BTech Student 2--------
Enter name: Arun
Enter age: 19
Enter register number: 235
Enter mark: 40
------BTech Student 3--------
Enter name: Shyam
Enter age: 20
Enter register number: 236
Enter mark: 55
------BTech Student 4--------
Enter name: Aravind
Enter age: 20
Enter register number: 237
Enter mark: 60
------BTech Student 1--------
Name: Arun
Age: 19
Reg No.: 235
Marks: 40

------BTech Student 2--------
Name: Rohit
Age: 20
Reg No.: 234
Marks: 55

------BTech Student 3--------
Name: Shyam
Age: 20
Reg No.: 236
Marks: 55

------BTech Student 4--------
Name: Aravind
Age: 20
Reg No.: 237
Marks: 60
```

2.

```
Select Course:
1. Btech
2. MTech
Enter choice: 2
Enter no. of Mtech Students: 3
```

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```
------MTech Student 1--------
Enter name: Shyam
Enter age: 25
Enter register number: 567
Enter Gpa: 7
------MTech Student 2--------
Enter name: Ram
Enter age: 26
Enter register number: 568
Enter Gpa: 5
------MTech Student 3--------
Enter name: Arun
Enter age: 24
Enter register number: 569
Enter Gpa: 9
------MTech Student 1--------
Name: Ram
Age: 26
Reg No.: 568
GPA: 5

------MTech Student 2--------
Name: Shyam
Age: 25
Reg No.: 567
GPA: 7

------MTech Student 3--------
Name: Arun
Age: 24
Reg No.: 569
GPA: 9
```