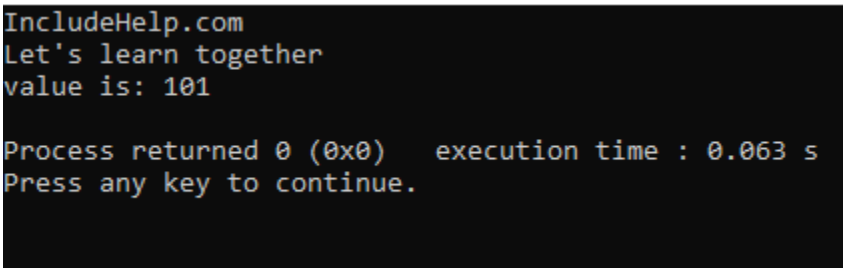
15B17CI371 – Data Structures Lab

ODD 2024

Week 0-LAB B

Practice Lab

1)



Yes, this code can serve as a basic skeleton for more complex problems. While the provided code is basic, its structure provides a solid foundation for creating more complex classes and programs. It demonstrates fundamental concepts in C++ that can be built upon for a variety of applications.

2)

```
#include <iostream>

using namespace std;


class naturalnumber {

public:

   int value;

   naturalnumber(int v) : value(v) {}


   naturalnumber operator+(const naturalnumber& other) {

      return naturalnumber(value + other.value);

   }
```

```
};

class complex {
public:
    double real, imag;
    complex(double r = 0, double i = 0) : real(r), imag(i) {}

    complex operator+(const complex& other) {
        return complex(real + other.real, imag + other.imag);
    }

    void display() const {
        cout << real << " + " << imag << "i" << endl;
    }
};

class matrix {
public:
    int rows, cols;
    int** data;

    matrix(int r, int c) : rows(r), cols(c) {
        data = new int*[rows];
        for (int i = 0; i < rows; ++i) {
            data[i] = new int[cols]();
        }
    }

    void input() {
```

```
    cout << "enter elements of the matrix (" << rows << "x" << cols << "):" << endl;
    for (int i = 0; i < rows; ++i) {
        for (int j = 0; j < cols; ++j) {
            cin >> data[i][j];
        }
    }
}

matrix operator+(const matrix& other) {
    if (rows != other.rows || cols != other.cols) {
        cerr << "matrices dimensions do not match!" << endl;
        exit(EXIT_FAILURE);
    }
    matrix result(rows, cols);
    for (int i = 0; i < rows; ++i) {
        for (int j = 0; j < cols; ++j) {
            result.data[i][j] = data[i][j] + other.data[i][j];
        }
    }
    return result;
}

void display() const {
    for (int i = 0; i < rows; ++i) {
        for (int j = 0; j < cols; ++j) {
            cout << data[i][j] << " ";
        }
        cout << endl;
    }
```

```
    }

    ~matrix() {
        for (int i = 0; i < rows; ++i) {
            delete[] data[i];
        }
        delete[] data;
    }
};

int main() {
    naturalnumber num1(10), num2(20);
    naturalnumber sum = num1 + num2;
    cout << "sum of natural numbers: " << sum.value << endl;

    complex c1(3.4, 5.6), c2(1.2, 4.3);
    complex csum = c1 + c2;
    cout << "sum of complex numbers: ";
    csum.display();

    int rows, cols;
    cout << "enter the number of rows and columns for matrices: ";
    cin >> rows >> cols;

    matrix m1(rows, cols), m2(rows, cols);
    m1.input();
    m2.input();
    matrix msum = m1 + m2;
```

```
    cout << "sum of matrices:" << endl;

    msum.display();


    return 0;

}
```

```
sum of natural numbers: 30
sum of complex numbers: 4.6 + 9.9i
enter the number of rows and columns for matrices: 2 2
enter elements of the matrix (2x2):
12 7
19 6
enter elements of the matrix (2x2):
23 17
11 5
sum of matrices:
35 24
30 11
```

3)

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


class vendor
{
    public:
    string name;
    int liscnumber;
    int lanq;
    int keyboard_sp;

    void inputdetails()
    {
        cout<<"enter the name of the vendor : ";
        cin>>name;
        cout<<"enter the License number of the vendor : ";
        cin>>liscnumber;
        cout<<"enter the quantity of LAN cables available : ";
        cin>>lanq;
        cout<<"enter the selling price of the keyboard : ";
        cin>>keyboard_sp;
    }
```

```
void printdetails()

{
   cout<<"\n\nPrinting Details :\n\n";
   cout<<"name of the vendor : "<<name<<"\n";

   cout<<"License number of the vendor : "<<liscnumber<<"\n";

   cout<<"quantity of LAN cables available : "<<lanq<<"\n";

   cout<<"selling price of the keyboard : "<<keyboard_sp<<"\n";
}
void compareven(vendor v1,vendor v2)
{
   if(v1.keyboard_sp>v2.keyboard_sp)
   {
      cout<<"Vendor "<<v2.name<<" has lower selling price of the keyboard \n";
   }
   else
   {
      cout<<"Vendor "<<v1.name<<" has lower selling price of the keyboard \n";

   }
   if(v1.lanq>v2.lanq)
   {
      cout<<"Vendor "<<v1.name<<" has more LAN cables\n";
   }
   else
   {
      cout<<"Vendor "<<v2.name<<" has more LAN cables\n";

   }

}
void findv(vendor p[],int countr)
{
   int maxlan= p[0].lanq;
   int index = 0;
   for(int i=0; i<countr; i++)
   {
      if(p[i].lanq>maxlan)
      {
         maxlan=p[i].lanq;
         index=i;
      }
   }
   cout<<"the vendor with maximum quantity of LAN cables is : "<<p[index].name<<"\n\n";
}
void findprice(vendor k[],int countr)
{
   int minprice = k[0].keyboard_sp;
```

```
        int index = 0;
        for(int i=0; i<countr; i++)
        {
            if(k[i].keyboard_sp<minprice)
            {
                minprice=k[i].keyboard_sp;
                index=i;
            }
        }
        cout<<"the vendor with maximum quantity of LAN cables is : "<<k[index].name<<"\n\n";
    }

};



int main()
{
    int countr;
    cout<<"enter the number of counter : ";
    cin>>countr;
    vendor * arr = new vendor[countr];
    for(int i=0;i<countr;i++)
    {

        arr[i].inputdetails();
    }

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

        arr[i].printdetails();
    }
    int index1,index2;
    cout<<"enter the indexes of the vendors to be compared : ";
    cin>>index1>>index2;
    arr[0].compareven(arr[index1],arr[index2]);
    arr[0].findprice(arr,countr);
    arr[0].findv(arr,countr);
    return 0;
}
```

```
enter the number of counter : 3
enter the name of the vendor : A
enter the License number of the vendor : 123
enter the quantity of LAN cables available : 23
enter the selling price of the keyboard : 1234
enter the name of the vendor : K
enter the License number of the vendor : 7777
enter the quantity of LAN cables available : 77
enter the selling price of the keyboard : 4747
enter the name of the vendor : S
enter the License number of the vendor : 34
enter the quantity of LAN cables available : 43
enter the selling price of the keyboard : 4343


Printing Details :

name of the vendor : A
License number of the vendor : 123
quantity of LAN cables available : 23
selling price of the keyboard : 1234


Printing Details :

name of the vendor : K
License number of the vendor : 7777
quantity of LAN cables available : 77
selling price of the keyboard : 4747


Printing Details :

name of the vendor : S
License number of the vendor : 34
quantity of LAN cables available : 43
selling price of the keyboard : 4343
enter the indexes of the vendors to be compared :
```

4)

a.

```
#include<iostream>

using namespace std;

class Test {
```

```
    public:
 int x;
};
int main()
{
 Test t;
 cout << t.x;
 return 0;
}
```

Output

Error: The variable ‘x’ is private within the context and cannot be accessed outside the class.

b.

```
#include<iostream>
using namespace std;
class Empty {};
int main()
{
 cout << sizeof(Empty);
 return 0;
}
```

Output:1

```
1
Process returned 0 (0x0)   execution time : 0.016 s
Press any key to continue.
```

c.

```
#include<iostream>
```

```
using namespace std;

class Test

{

 static int x;

 int *ptr;

 int y;

};

int main()

{

 Test t;

 cout << sizeof(t)<<"\n";

cout << sizeof(Test *);

}
```

Output:

```
16
8
Process returned 0 (0x0)   execution time : 0.094 s
Press any key to continue.
```

d.

```
#include <iostream>

class Test

{

public:
```

```
 int i;
 void get();
};
void Test::get()
{
 std::cout << "Enter the value of i:"<<"\n";
std::cin>>i;
}
Test t;
int main()
{
 Test t; // local object
 t.get();
std::cout <<"value of i in local t:"<<t.i<<"\n";
::t.get();
std::cout << "value of i in global t:"<<::t.i<<"\n";
 return 0;
}
```

Output:

```
Enter the value of i:
2
value of i in local t:2
Enter the value of i:
4
value of i in global t:4

Process returned 0 (0x0)   execution time : 9.827 s
Press any key to continue.
```

e.

```
#include <iostream>
#include <string>
using namespace std;
class Student {
private:
 int rollNo;
 string stdName;
 float perc;
public:
 void setValue()
 {
 rollNo = 0;
stdName = "None";
 perc = 0.0f;
 }
 void printValue()
 {
 cout << "Student's Roll No.: " << rollNo <<
"\n";
 cout << "Student's Name: " << stdName <<
"\n";
 cout << "Student's Percentage: " << perc <<
"\n";
 }
```

```
};
int main()
{
 Student std;
 std.setValue();
std.printValue();
 return 0;
}
```

```
Student's Roll No.: 0
Student's Name: None
Student's Percentage: 0

Process returned 0 (0x0)   execution time : 0.047 s
Press any key to continue.
```

f.

```
#include <iostream>
using namespace std;
class Person {
};
int main() {
 Person per;
 cout << "size of per: " << sizeof(per) << endl;

 return 0;
```

}

```
size of per: 1

Process returned 0 (0x0)   execution time : 0.125 s
Press any key to continue.
```