CSE102L Computer Programming Lab

LAB # 5

2020

Submitted to:

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Semester: 3nd

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"On my honor, as student of University of Engineering and Technology, I have neither given nor received unauthorized assistance on this academic work."

NOV, 26 , 2020

Department of Computer Systems Engineering

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Objectives of the Lab:

Objectives of the lab are to:

- Clearly understand the purpose and advantages of OOP
- Understand the concept of a Class and Objects
- Develop a basic class containing Data Members and Member Functions
- Use access specifiers to access Class Members
- Make Simple and Overloaded Constructor
- Use the Class Objects and Member Functions to provide and extract data from Object
- Practice with Classes and Objects

Activity # 01

Title:

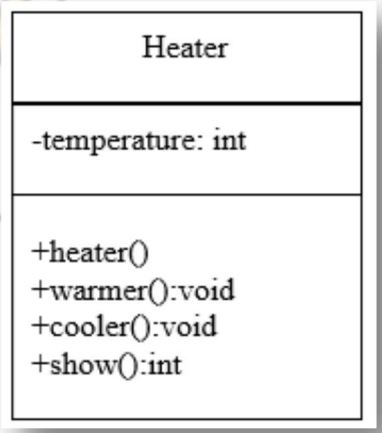
Make a class for heater and model it using temperature.

Problem analysis:

Create a class, **Heater** that contains a single integer field, **temperature**. Define a constructor that takes no parameters. The **temperature** field should be set to the value 15 in the constructor. Define the mutators **warmer** and **cooler**, whose effect is to increase or decrease the value of the temperature by 5 respectively. Define an accessor method to return the value of **temperature**. Demonstrate the use of Heater class.

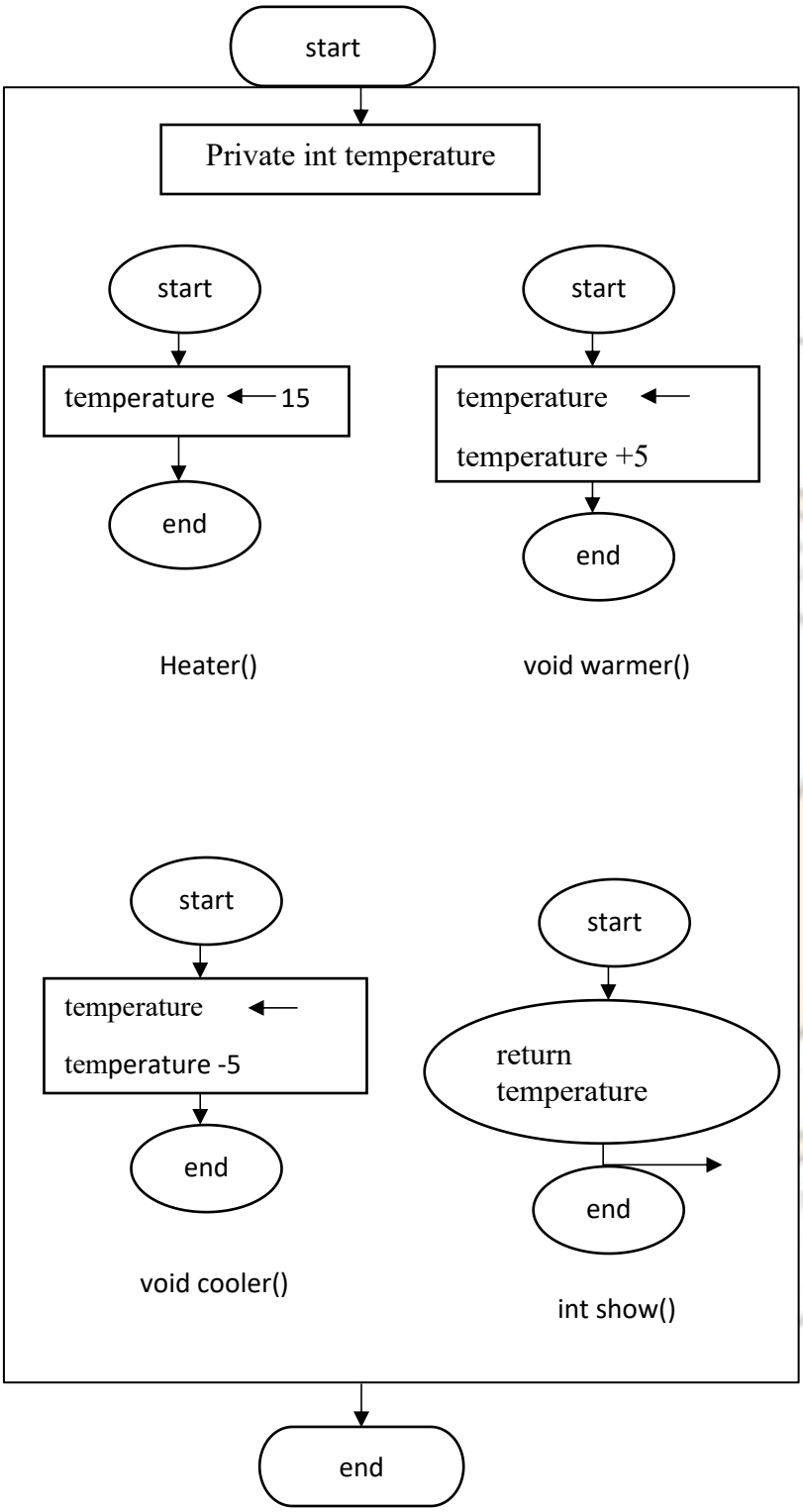
Algorithm:

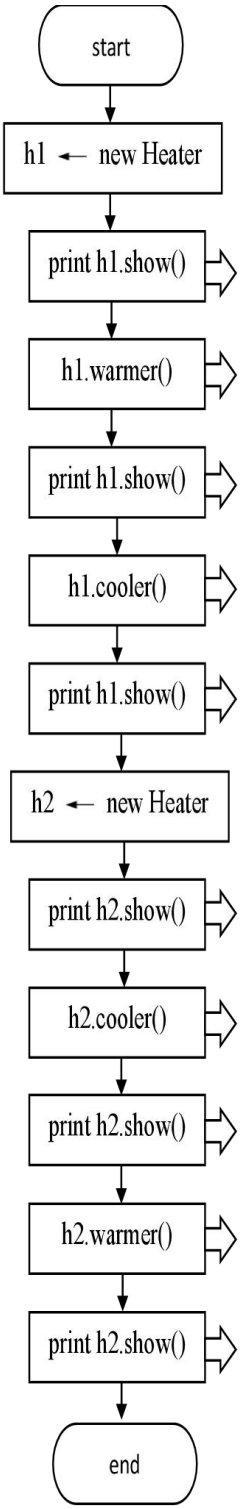
UML diagram for the above problem is given below:



- First make class heater
- Declare temperature as private integer field
- Define no argument constructor to set value of temperature to 15
- Define warmer and cooler method to increase and decrease temperature by 5 respectively
- Define show function to return the temperature value.
- In main function, make objects of heater to demonstrate the use of heater
- Call each function one after the other and display the show function as shown in the flow chart.

Flowchart:


start
Private int temperature
start
temperature ← 15
end
Heater()
start
temperature ←
temperature +5
end
void warmer()
start
temperature ←
temperature -5
end
void cooler()
start
return
temperature
end
int show()
end


start
h1 ← new Heater
print h1.show()
h1.warmer()
print h1.show()
h1.cooler()
print h1.show()
h2 ← new Heater
print h2.show()
h2.cooler()
print h2.show()
h2.warmer()
print h2.show()
end

In C++

Source code:

```
#include <iostream>
using namespace std;
//create a class
class Heater{
    private:
        int temperature;

    public:
        Heater()//constructor
        {
            temperature=15;
        }

        void warmer()//function
        {
            temperature+=5;
        }

        void cooler()//function
        {
            temperature-=5;
        }

        int show()//function
        {
            return temperature;
        }
};

int main()
{

    Heater h1;
    cout<<"                    For Heater 1: "<<endl;
    cout<<"Temperature : "<<h1.show()<<endl;
    cout<<"Warmer Temperature: ";
    h1.warmer();
    cout<<h1.show()<<endl;
    cout<<"Cool temperature: ";
    h1.cooler();
    cout<<h1.show()<<endl;

     Heater h2;
    cout<<"                    For Heater 2: "<<endl;
```

Output

```
D:\Documents\oop lab\heater_2.exe
                    For Heater 1:
Temperature : 15
Warmer Temperature: 20
Cool temperature: 15
                    For Heater 2:
Temperature : 15
Cool temperature:10
Warmer Temperature: 15

--------------------------------
Process exited after 0.06597 seconds with return value 0
Press any key to continue . . .
```

```
    cout<<"Temperature : "<<h2.show()<<endl;
    cout<<"Cool temperature:";
    h2.cooler();
    cout<< h2.show()<<endl;
    cout<<"Warmer Temperature: ";
    h2.warmer();
    cout<<  h2.show()<<endl;
    return 0;
}
```

In Python

Source code:

```
class Heater:
    def __init__(self):
        self.temp = 15;
    def warmer(self):
        self.temp+=5
    def cooler(self):
        self.temp-=5
    def show(self):
        return self.temp
print("      Heater 1")
obj1 = Heater()
print("temperature is: ", obj1.show())
obj1.warmer()
print("warmer temperature is: ", obj1.show())
obj1.cooler()
print("cooler temperature is: ", obj1.show())

print("      Heater 2")
obj2 = Heater()
print("temperature is: ", obj2.show())
obj2.cooler()
```

Output:

```
      Heater 1
temperature is:  15
warmer temperature is:  20
cooler temperature is:  15
      Heater 2
temperature is:  15
cooler temperature is:  10
warmer temperature is:  15
```

```
print("cooler temperature is: ", obj2.show())
obj2.warmer()
print("warmer temperature is: ", obj2.show())
```

Conclusion:

This program helps us in understanding the basic concepts of classes and objects in different languages. It acts as a base for us and helps us in preparing ourselves for the higher level of programming. We get to know about the constructor and method in OOP with the help of this program.

Activity # 02

Title:

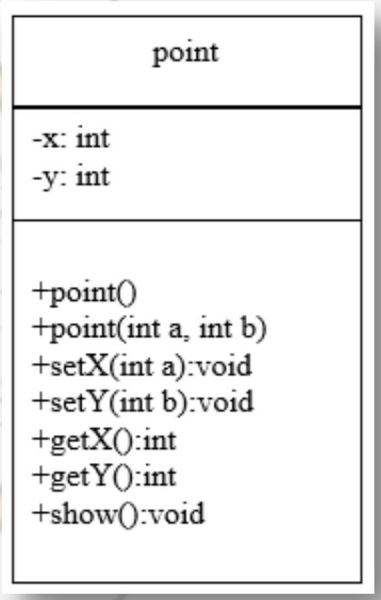
Make a class for point and model it using x & y coordinates.

Problem analysis:

Create a class called **Point** that has two data members: **x**- and **y**-coordinates of the point. Provide a no argument and a 2-argument constructor. Provide separate get and set functions for the each of the data members i.e. **getX**, **getY**, **setX**, **setY**. The getter functions should return the corresponding values to the calling function. Provide a **display** method to display the point in (x, y) format. Make appropriate function **const**.

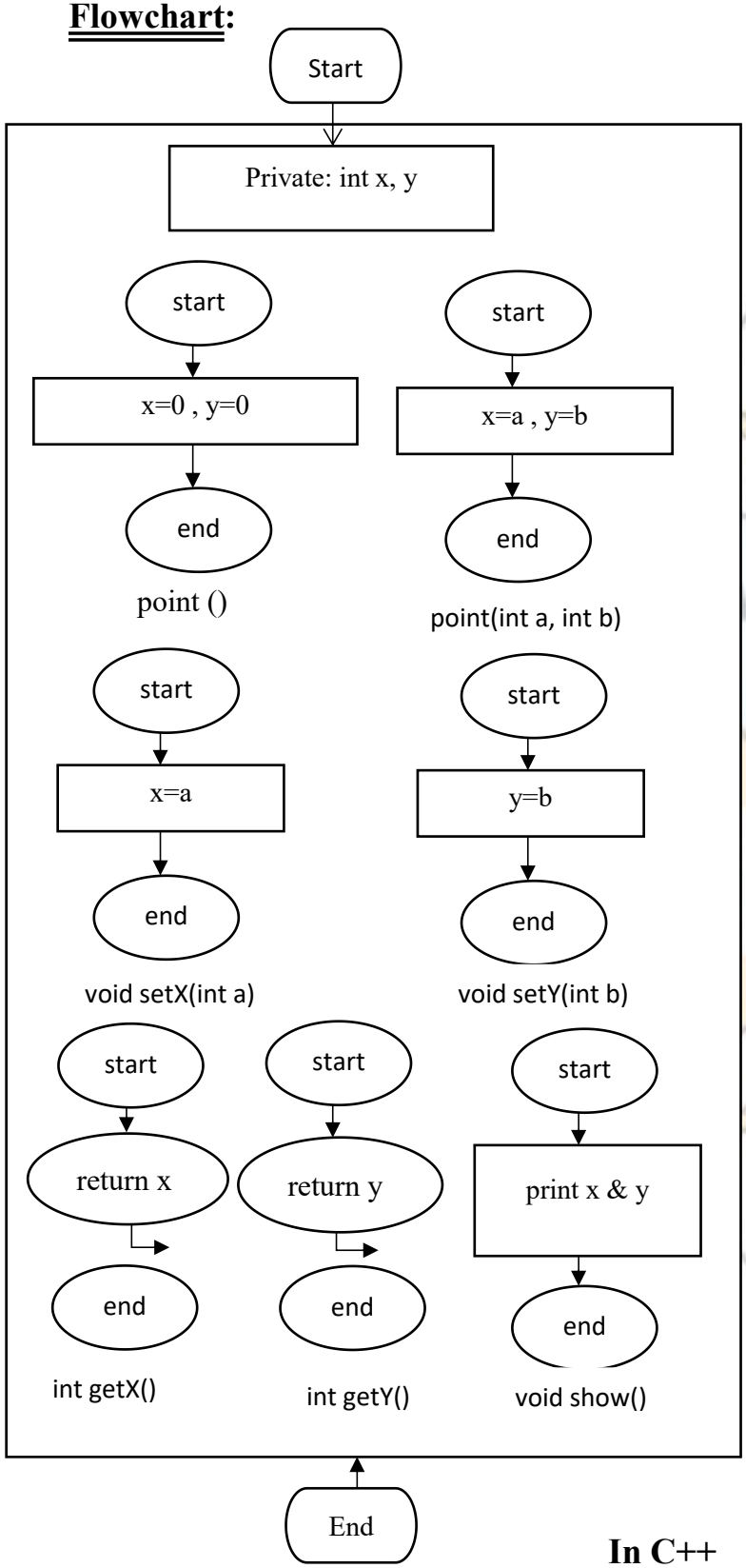
Algorithm:

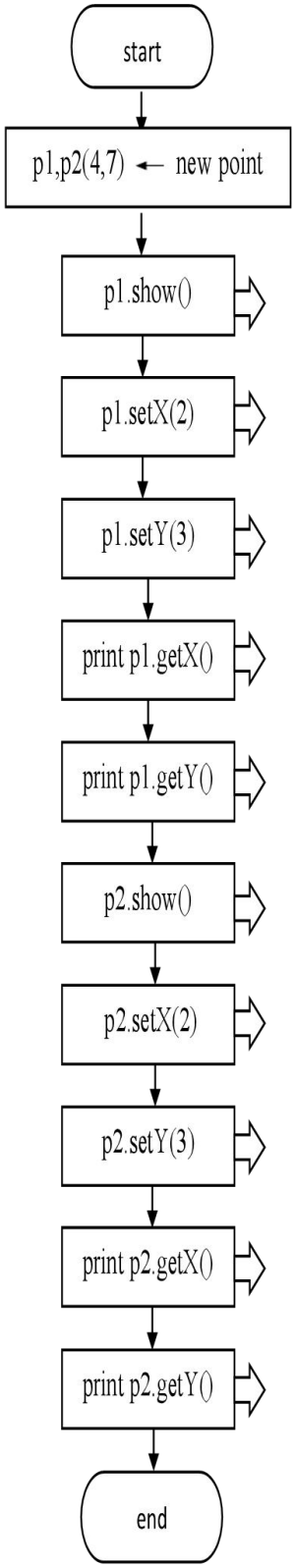
UML diagram for the above problem is given below:



- First make class point.
- Declare x & y co-ordinate as private integer field
- Define no argument constructor to set value of x & y to 0.
- Define argument constructor to set the parameters of x & y.
- Define setX and setY method to set the value of x & y respectively.
- Define getX and getY method to get the value of x & y.
- Define show function to display the constructor's output.
- In main function, make objects of point to demonstrate the use of point.
- Call each function one after the other and display the show function as shown in the flow chart.

Flowchart:





In C++

Source code:

```
#include <iostream>
using namespace std;
//create a class point
class point{
    private:
        int x;
        int y;
    public:
    point()//constructor without parameters
    {
        x=0;
        y=0;
    }
    point(int a, int b)//constructor with parameter
    {
        x=a;
        y=b;
    }
    void setx(int a)
    {
        x=a;
    }
    void sety(int b)
    {
        y=b;
    }
    int getx()
    {
        return x;
```

Output

```
D:\Documents\oop lab\getx_setx.exe
Original point 1: (0,0)
Upadated point 1: (5,3)

Original point 2: (2,9)
Upadated point 2: (5,3)

--------------------------------
Process exited after 0.06981 seconds with return value 0
Press any key to continue . . .
```

```
    }
    int gety()
    {
        return y;
    }
    void show()
    {
        cout<<"("<<x<<","<<y<<")"<<endl;
    }
};
int main()
{
    point p1,p2(2,9);
    //for point 1
    cout<<"Original point 1: ";
    p1.show();
    cout<<"Upadated point 1: ";
    p1.setx(5);
    p1.sety(3);
    cout<<"("<<p1.getx()<<","<<p1.gety()<<")"<<endl;
    //for point 2
    cout<<"\nOriginal point 2: ";
    p2.show();
    cout<<"Upadated point 2: ";
    p2.setx(5);
    p2.sety(3);
    cout<<"("<<p2.getx()<<","<<p2.gety()<<")"<<endl;
    return 0;
}
```

In Python

Source code:

```
class Point:
    def __init__(self, a,b):
        self.x=a
        self.y=b

    def setX(self,p):
        self.x=p
    def setY(self,p):
        self.y=p

    def getX(self):
        return self.x

    def getY(self):
        return self.y

    def show(self):
        print("(", self.x, ",", self.y, ")")

print("Original point 1")
p1 = Point(0,0)
p1.show()

print("updated point 1:")
p1.setX(3)
p1.setY(4)
print("(", p1.getX(), ",", p1.getY(), ")")

print("Original point 2")
p2 = Point(1,2)
p2.show()

print("updated point 1:")
p2.setX(7)
p2.setY(8)
print("(", p2.getX(), ",", p2.getY(), ")")
```

Output:

```
Original point 1
( 0 , 0 )
updated point 1:
( 3 , 4 )
Original point 2
( 1 , 2 )
updated point 1:
( 7 , 8 )
```

Conclusion:

This program helps us in understanding the basic concepts of classes and objects in different languages. It acts as a base for us and helps us in preparing ourselves for the higher level of

programming. We get to know about the constructor and method in OOP with the help of this program.

Activity # 03

Title:

Make a class for Bank Acount and model it using balance.

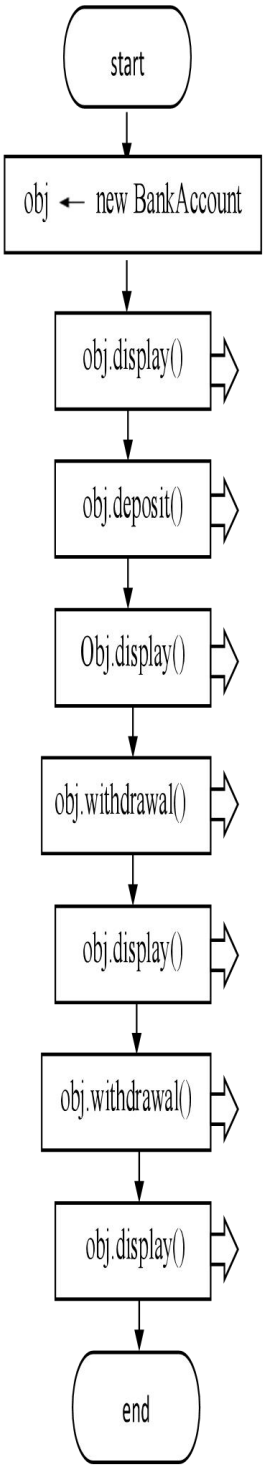
Problem analysis:

Create a class called ***Bank Account*** that models a checking account at a bank. The program creates an account with an opening balance, displays the balance, makes a deposit and a withdrawal, and then displays the new balance. Note in withdrawal function, if balance is below Rs. 500 then display message showing insufficient balance otherwise allow withdrawal.

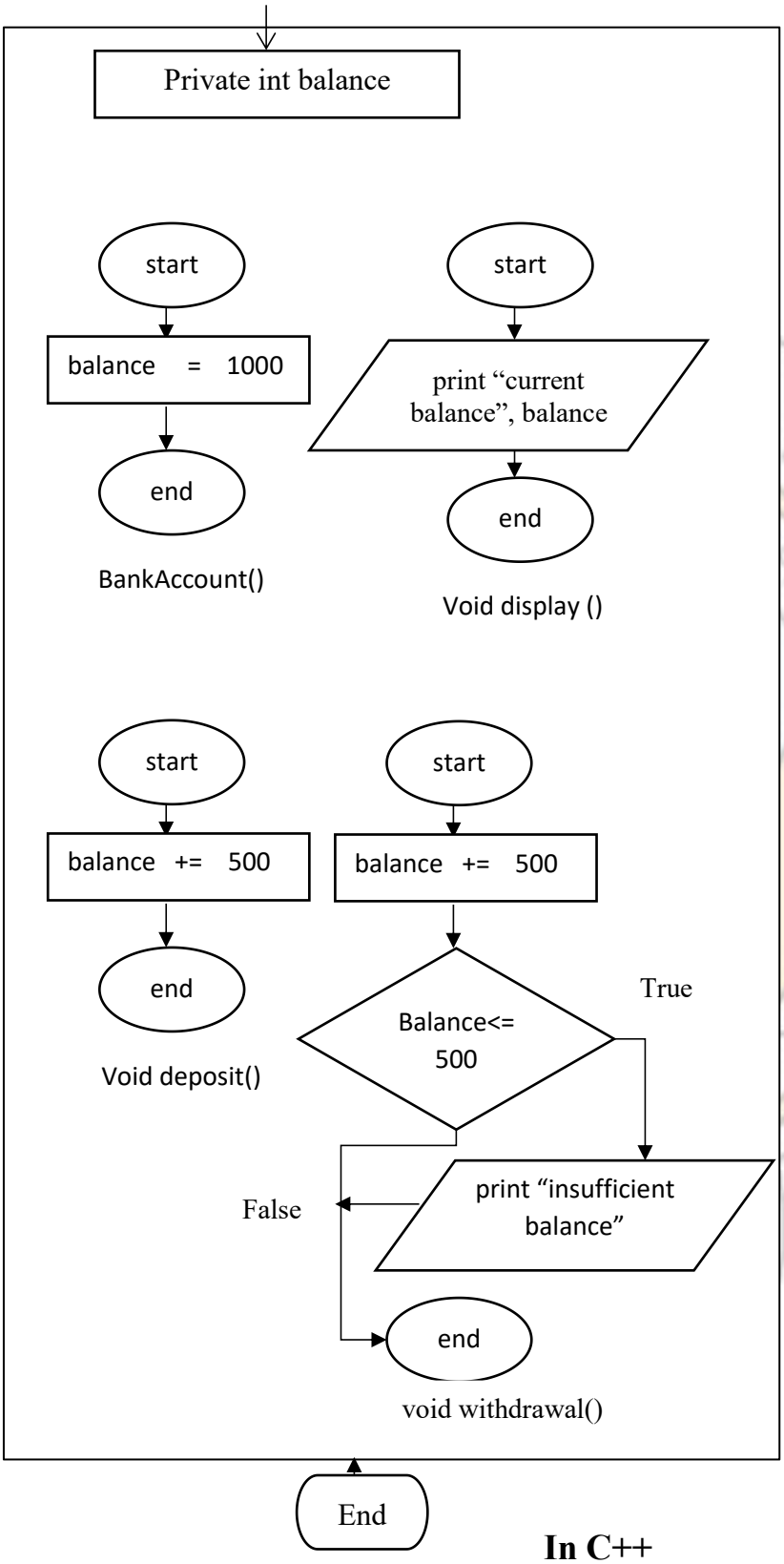
Algorithm:

UML diagram for the above problem is given below:

- First make class Bank Account.
- Declare balance as private integer field.
- Define no argument constructor to set value of balance to 1000.
- Define deposit and withdrawal method to increase and decrease balance by 500 respectively
- Define display function to display the output
- In main function, make objects of bank account to demonstrate the use of bank account.
- Call each function one after the other and display the output as shown in the flow chart.



Flowchart:



In C++

Source code: **Output**

```
#include <iostream>
using namespace std;
//create class for bank account
class BankAccount{
    private:
        int balance;
    public:
        BankAccount()//constructor
without parameter
        {
            balance=1000;
        }
        void display()
        {
            cout<<"current balance: "<<balance<<endl;

        }
        void deposit()
        {
            balance+=500;
        }
        void withdrawal()
        {
            balance-=500;
            if(balance<=500)
                cout<<"insufficient balance: "<<balance<<endl;;
        }
};

int main()
{
```

```
D:\Documents\oop lab\bank_account.exe
current balance: 1000
after deposit

current balance: 1500
after withdrawal

current balance: 1000
after withdrawal

insufficient balance: 500
current balance: 500

--------------------------------
Process exited after 0.06559 seconds with return value 0
Press any key to continue . . .
```

```
    BankAccount obj;//create object for class
    obj.display();
    obj.deposit();
    cout<<"after deposit "<<endl;;
    obj.display();
    obj.withdrawal();
    cout<<"after withdrawal"<<endl;
    obj.display();
    cout<<"after withdrawal"<<endl;
    obj.withdrawal();
    obj.display();
    return 0;
}
```

In Python

Source code:

```
class BankAccount:
    def __init__(self):
          self.balance=1000

    def display(self):
        print("current balance", self.balance)

    def deposit(self):
        self.balance+=500

    def withdrawal(self):
        self.balance-=500
        if self.balance <=500:
            print("insufficient balance: ",self.balance)

obj = BankAccount()
obj.display()
obj.deposit()
print("after deposit ")
obj.display()
obj.withdrawal()
print("after withdrawal")
obj.display()
```

Output:

```
current balance 1000
after deposit
current balance 1500
after withdrawal
current balance 1000
after withdrawal
insufficient balance:  500
current balance 500
```

```
print("after withdrawal")
obj.withdrawal()
obj.display()
```

Conclusion:

This program helps us in understanding the basic concepts of classes and objects in different languages. It acts as a base for us and helps us in preparing ourselves for the higher level of programming. We get to know about the constructor and method in OOP with the help of this program.