

Programming Laboratory-I

Assignment No-2

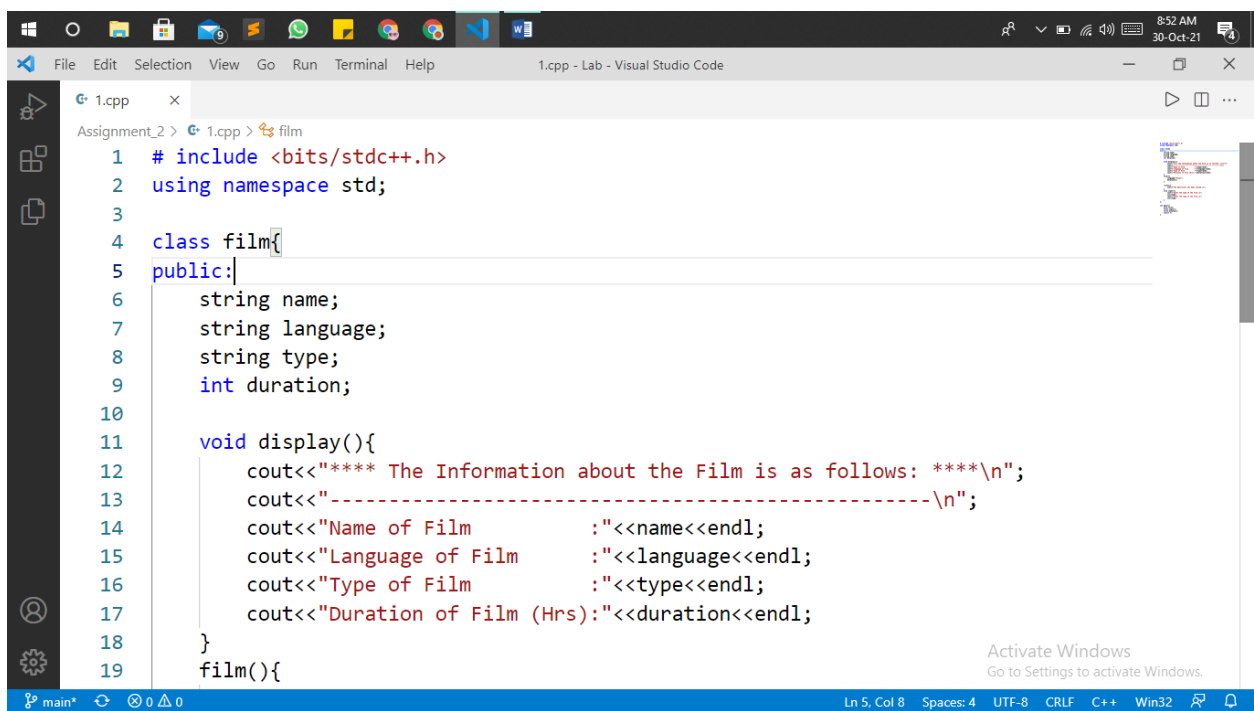
(Constructors, Destructors and Static members)

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1. Create a class Film (Name, Language, Type and Duration). Create a default constructor to initialize Language and Duration as 'Hindi' and 3 (hrs.). Insert rest of the details through function. Display all the details. (Use destructor as well)

PROGRAM



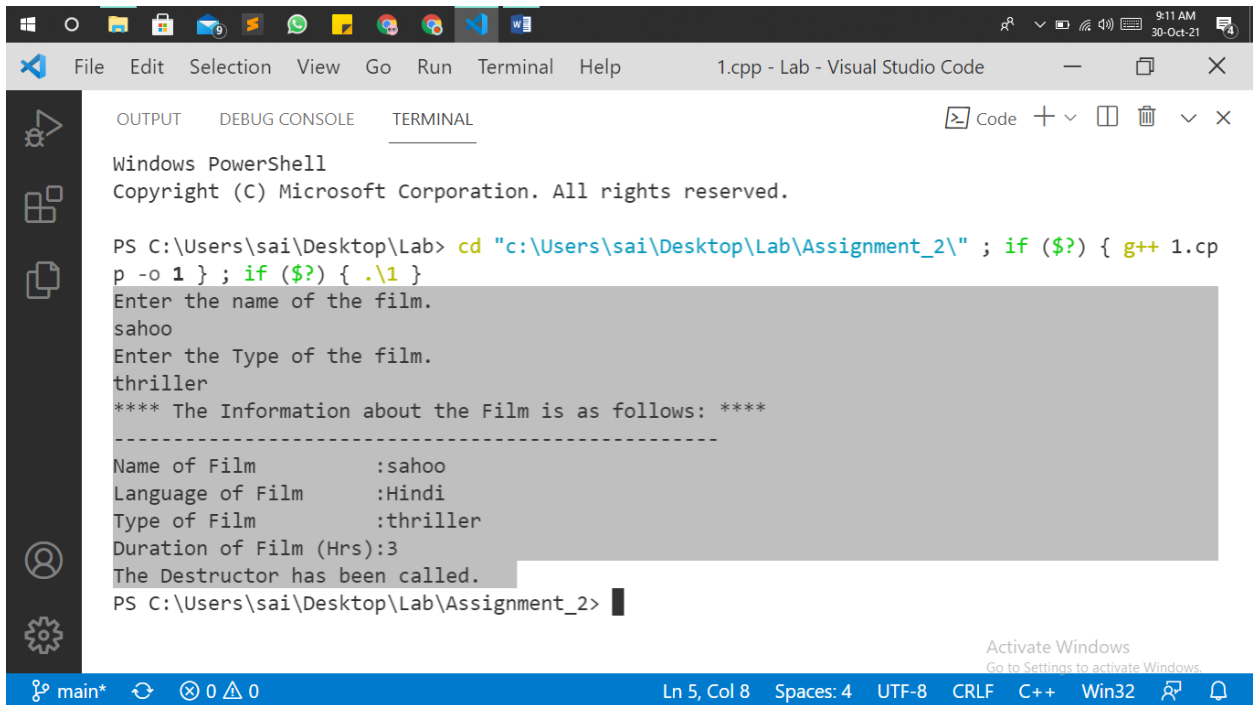
```
1 #include <bits/stdc++.h>
2 using namespace std;
3
4 class film{
5 public:
6     string name;
7     string language;
8     string type;
9     int duration;
10
11     void display(){
12         cout<<"**** The Information about the Film is as follows: ****\n";
13         cout<<"-----\n";
14         cout<<"Name of Film      : "<<name<<endl;
15         cout<<"Language of Film   : "<<language<<endl;
16         cout<<"Type of Film        : "<<type<<endl;
17         cout<<"Duration of Film (Hrs): "<<duration<<endl;
18     }
19     film(){
```

The screenshot shows the Visual Studio Code interface with a C++ file named 1.cpp. The code defines a class 'film' with attributes name, language, type, and duration. It includes a display() function that prints the details of the film in a formatted manner. The default constructor film() is partially visible at the bottom of the code block.

```
16         cout<<"Type of Film           : "<<type<<endl;
17         cout<<"Duration of Film (Hrs): "<<duration<<endl;
18     }
19     film(){
20         language="Hindi";
21         duration=3;
22     }
23
24     ~film(){
25         cout<<"The Destructor has been called.\n";
26     }
27     void input(){
28         cout<<"Enter the name of the film.\n";
29         cin>>name;
30         cout<<"Enter the Type of the film.\n";
31         cin>>type;
32     }
33 };
34
```

```
31         cin>>type;
32     }
33 };
34
35 int main(){
36     film first;
37     first.input();
38     first.display();
39     return 0;
40 }
```

OUTPUT :



The screenshot shows the Visual Studio Code interface with a terminal window open. The terminal displays the output of a C++ program. The program prompts the user to enter the name of the film, the type of film, and the duration of the film. The user enters 'sahoo', 'thriller', and '3' respectively. The program then displays the information about the film in a formatted table. The terminal output is as follows:

```
Windows PowerShell
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PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\Lab\Assignment_2\" ; if ($?) { g++ 1.cpp -o 1 } ; if ($?) { .\1 }
Enter the name of the film.
sahoo
Enter the Type of the film.
thriller
**** The Information about the Film is as follows: ****
-----
Name of Film      :sahoo
Language of Film  :Hindi
Type of Film      :thriller
Duration of Film (Hrs):3
The Destructor has been called.
PS C:\Users\sai\Desktop\Lab\Assignment_2>
```

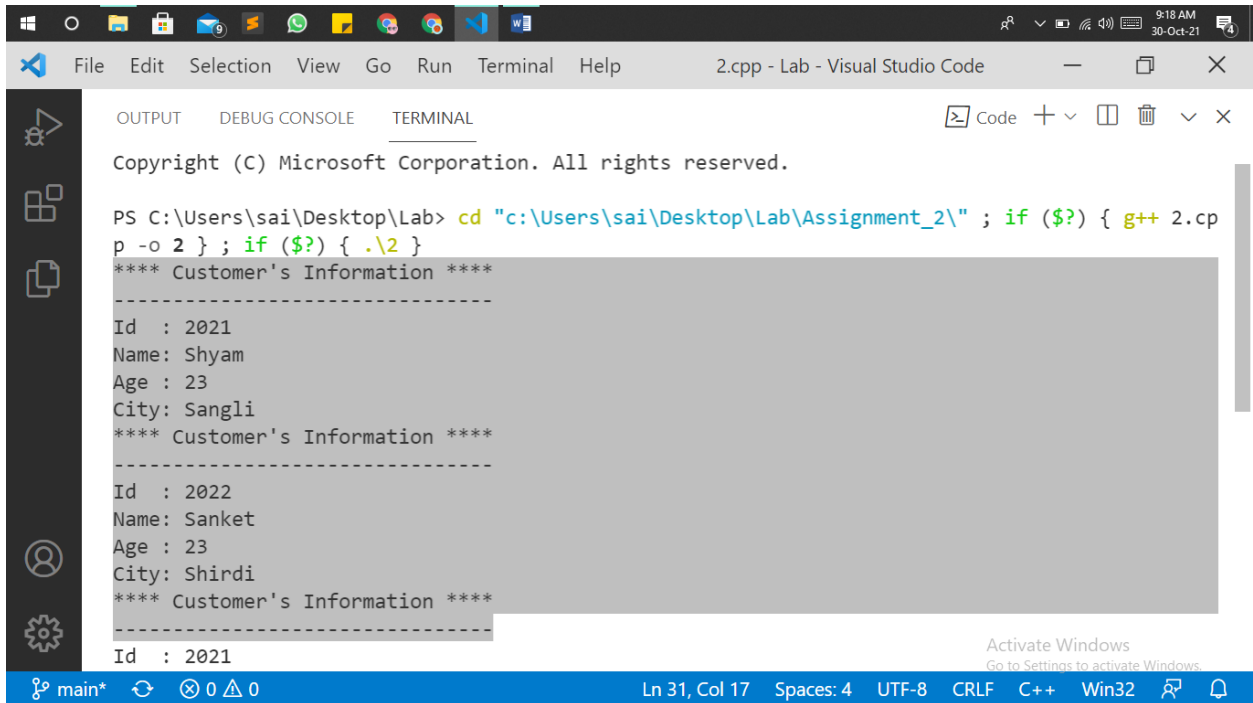
2. Create a class Customer (Cid, Cname, Age, City). Make all the members as private. Use parameterized constructor to assign values to it. Display all Customer information. (Add at least 5 records)

PROGRAM :

The image shows two screenshots of the Visual Studio Code editor. The top screenshot displays the first part of a C++ program, defining a `Customer` class with attributes `cid`, `cname`, `age`, and `city`, and a `display` method. The bottom screenshot shows the continuation of the program, including the `main` function where five `Customer` objects are created and their details are printed to the console. The status bar at the bottom indicates the current line and column (Ln 39, Col 40) and the active file (2.cpp).

```
1 #include <bits/stdc++.h>
2 using namespace std;
3
4 class Customer{
5     string cid;
6     string cname;
7     int age;
8     string city;
9
10 public:
11     Customer(string id,string name,int a,string c){
12         cid=id;
13         cname=name;
14         age=a;
15         city=c;
16     }
17
18     void display(){
19         cout<<"**** Customer's Information ****\n";
20
21         cout<<"Age : "<<age<<endl;
22         cout<<"City: "<<city<<endl;
23     }
24 };
25
26
27
28 int main(){
29     // 1st object
30     Customer a("2021","Shyam",23,"Sangli");
31     a.display();
32     // 2nd object
33     Customer a("2022","Sanket",23,"Shirdi");
34     a.display();
35     // 3rd object
36     Customer a("2021","asd",23,"Kopargaon");
37     a.display();
38     // 4th object
39     Customer a("22123","sm",23,"Pune");
40     a.display();
41     // 5th object
42     Customer a("1242","ABC",23,"Kashmir");
43     a.display();
44     return 0;
45 }
```

OUTPUT :



The screenshot shows the Visual Studio Code interface with the terminal window active. The terminal displays the output of a C++ program. The code in the background is as follows:

```
PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\Lab\Assignment_2\" ; if ($?) { g++ 2.cpp  
p -o 2 } ; if ($?) { .\2 }
```

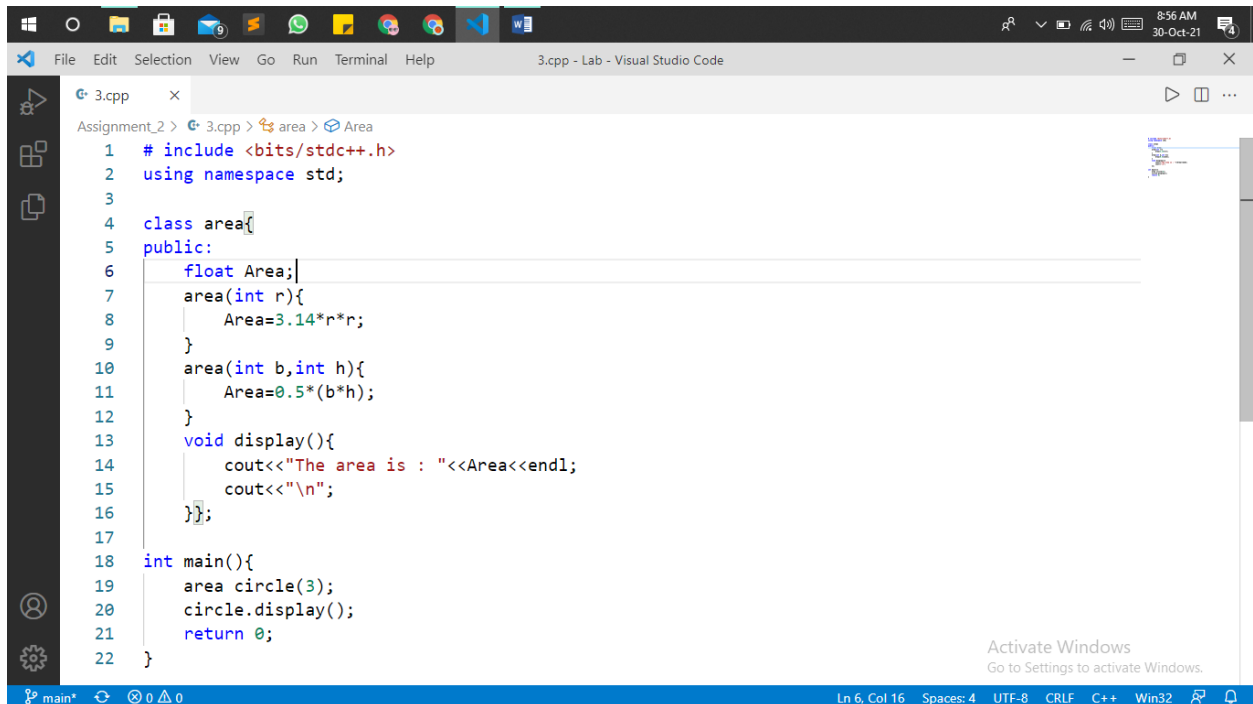
The output of the program is:

```
Copyright (C) Microsoft Corporation. All rights reserved.  
  
**** Customer's Information ****  
-----  
Id : 2021  
Name: Shyam  
Age : 23  
City: Sangli  
**** Customer's Information ****  
-----  
Id : 2022  
Name: Sanket  
Age : 23  
City: Shirdi  
**** Customer's Information ****  
-----  
Id : 2021
```

The status bar at the bottom indicates the file is 'main*', the cursor is at line 31, column 17, and the encoding is UTF-8.

3. With help of copy constructor calculate
 - a. Area of Circle
 - b. Area of Triangle
 - c. Area of Square

PROGRAM

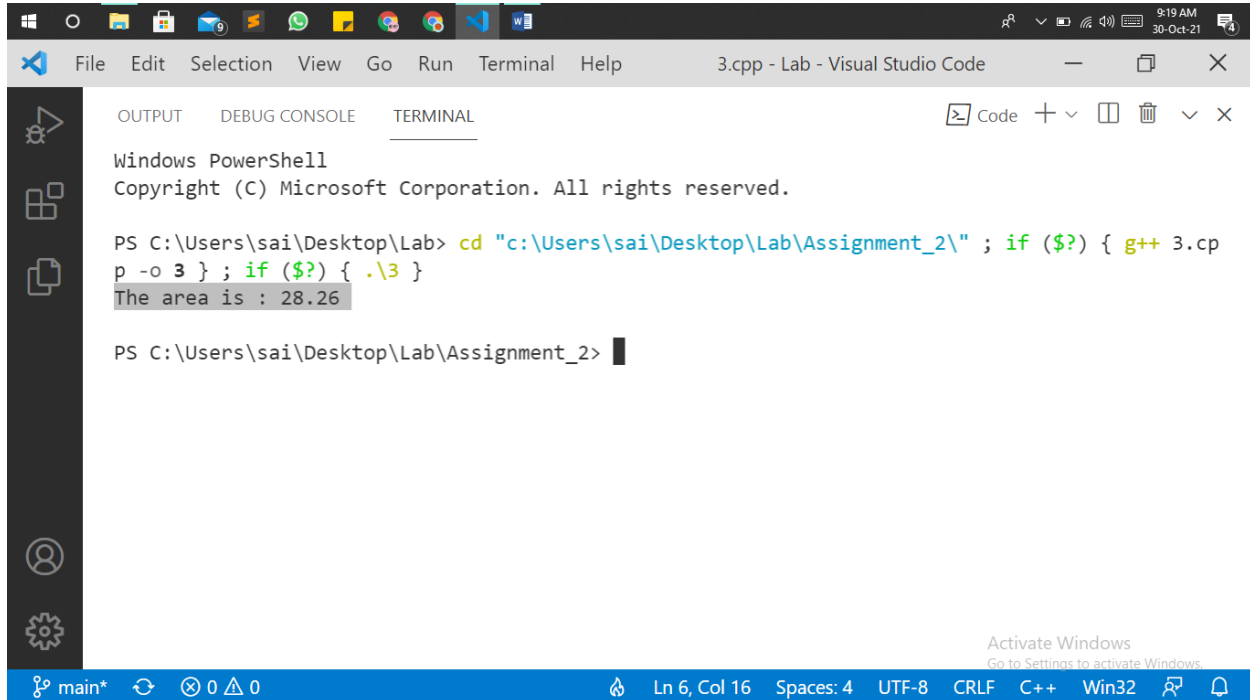


The screenshot shows the Visual Studio Code editor with a C++ file named '3.cpp' open. The code defines a class 'area' with two constructors and a display method. The main function creates an object of the 'area' class and calls the display method.

```
1 #include <bits/stdc++.h>  
2 using namespace std;  
3  
4 class area{  
5 public:  
6     float Area;  
7     area(int r){  
8         Area=3.14*r*r;  
9     }  
10    area(int b,int h){  
11        Area=0.5*(b*h);  
12    }  
13    void display(){  
14        cout<<"The area is : "<<Area<<endl;  
15        cout<<"\n";  
16    }  
17  
18 int main(){  
19     area circle(3);  
20     circle.display();  
21     return 0;  
22 }
```

The status bar at the bottom indicates the file is 'main*', the cursor is at line 6, column 16, and the encoding is UTF-8.

OUTPUT :



The screenshot shows the Visual Studio Code interface with a terminal window open. The terminal is running a Windows PowerShell session. The user has navigated to the directory `C:\Users\sai\Desktop\Lab\Assignment_2\` and executed a C++ program. The program calculates the area of a circle with a radius of 3. The output of the program is `The area is : 28.26`. The terminal window is titled `3.cpp - Lab - Visual Studio Code`. The status bar at the bottom indicates the file is `main*`, the cursor is at `Ln 6, Col 16`, and the file encoding is `UTF-8`.

```
Windows PowerShell
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PS C:\Users\sai\Desktop\Lab> cd "C:\Users\sai\Desktop\Lab\Assignment_2\" ; if ($?) { g++ 3.cpp -o 3 } ; if ($?) { .\3 }
The area is : 28.26

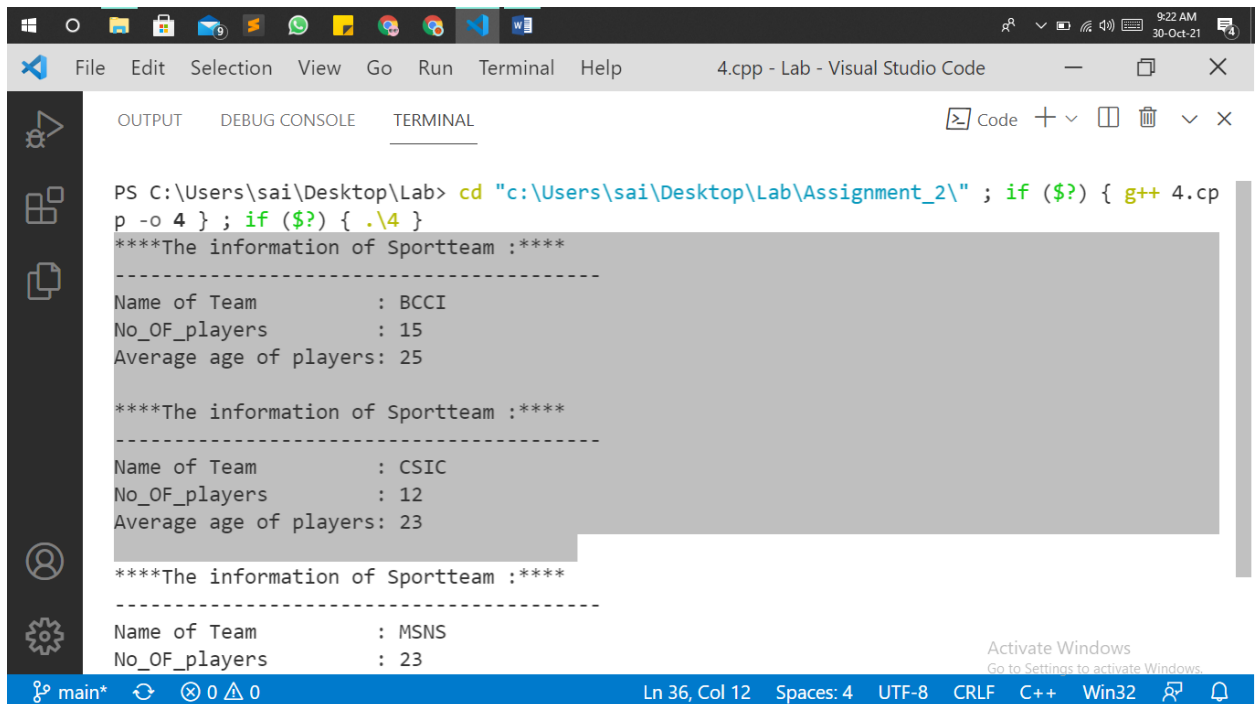
PS C:\Users\sai\Desktop\Lab\Assignment_2>
```

4. Create class SportsTeam (Name, NoOfPlayers, Average_age). Make a Static data member as ObjectCount. Create 3 Objects of SportsTeam, Insert and Display all information of 3 SportsTeam and Display count of object.
***Program:**

```
4.cpp
Assignment_2 > 4.cpp > Sportsteam
1  #include <bits/stdc++.h>
2  using namespace std;
3
4  class Sportsteam{
5  private:
6      static int count;
7  public:
8      string name;
9      int noofplayers;
10     int averageage;
11
12     Sportsteam(){
13         count++;
14     }
15
16     void insert(string n,int a,int b){
17         name=n;
18         noofplayers=a;
19         averageage=b;
20     }
21     void display(){
22         cout<<"****The information of Sportsteam :****\n";
23         cout<<"-----\n";
24     }
25 }
```

```
4.cpp
Assignment_2 > 4.cpp > Sportsteam
26     cout<<"Average age of players: "<<averageage<<endl;
27     cout<<"\n";
28 }
29
30 static int totalobjects(){
31     return count;
32 }
33 };
34 int Sportsteam::count=0;
35
36 int main(){
37     Sportsteam s1,s2,s3;
38     s1.insert("BCCI",15,25);
39     s2.insert("CSIC",12,23);
40     s3.insert("MSNS",23,34);
41     s1.display();
42     s2.display();
43     s3.display();
44     // TO display the number of the objects declared in the scope
45     cout<<"Count of Objects: "<<Sportsteam::totalobjects()<<endl;
46     return 0;
47 }
```

OUTPUT :



```
PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\Lab\Assignment_2\" ; if ($?) { g++ 4.cpp -o 4 } ; if ($?) { .\4 }
****The information of Sportteam :****
-----
Name of Team      : BCCI
No_OF_players     : 15
Average age of players: 25

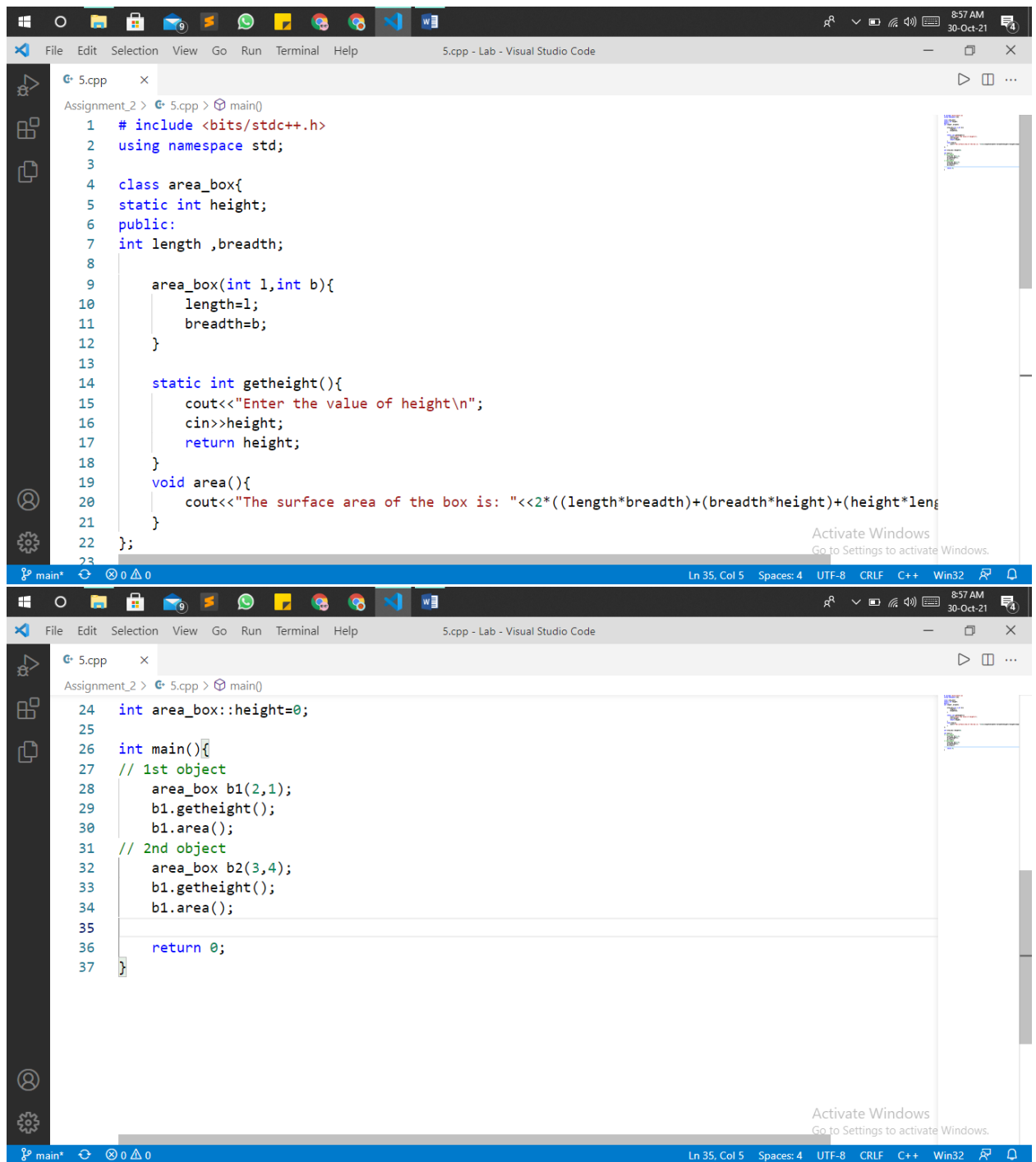
****The information of Sportteam :****
-----
Name of Team      : CSIC
No_OF_players     : 12
Average age of players: 23

****The information of Sportteam :****
-----
Name of Team      : MSNS
No_OF_players     : 23
```

Visual Studio Code interface showing the terminal output of a C++ program. The program prints the information for three teams: BCCI, CSIC, and MSNS. The status bar at the bottom indicates the current file is 'main*', line 36, column 12, with 4 spaces, UTF-8 encoding, CRLF line endings, and C++ language. The Windows taskbar at the top shows the time as 9:22 AM on 30-Oct-21.

5. Calculate area of Box (Length, Breadth, Height). Consider Height as static member (Need to initialize). Use static member function getHeight() which will return value of Height. Create function Area() which will calculate area of Box. Use parameterized constructor to initialize data (insert data from keyboard). Create two objects.

PROGRAM

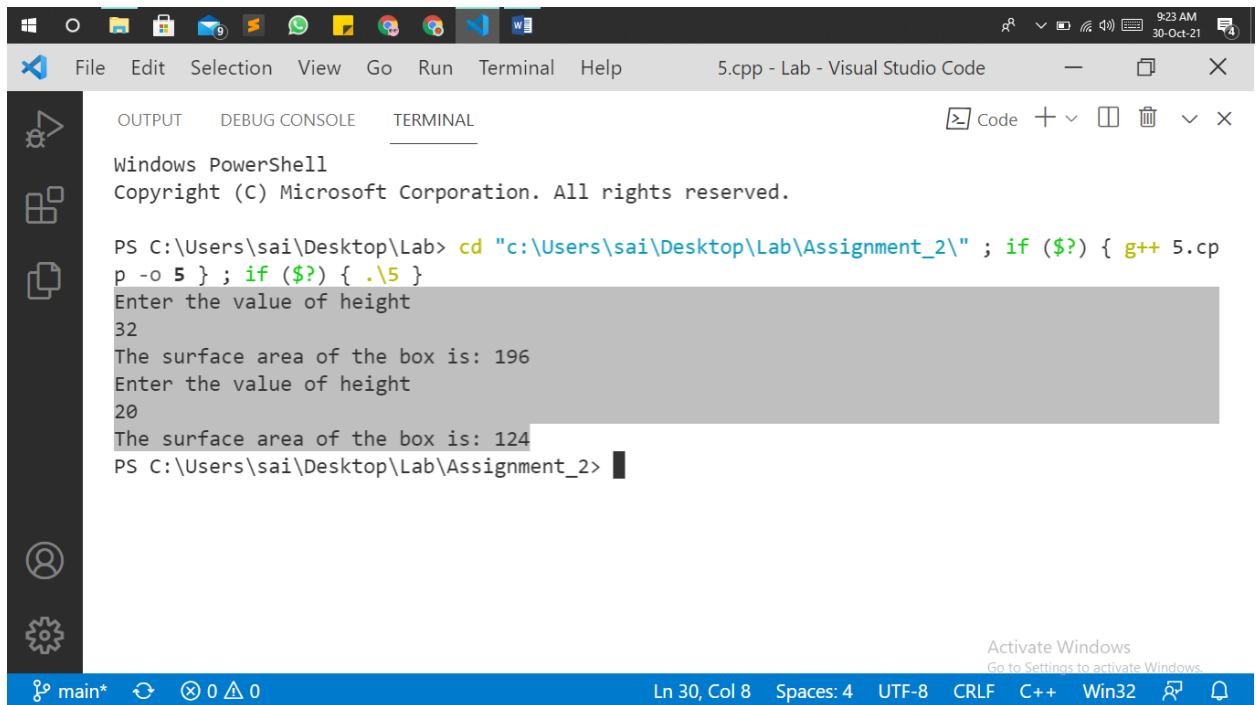


```
5.cpp
Assignment_2 > 5.cpp > main()
1  #include <bits/stdc++.h>
2  using namespace std;
3
4  class area_box{
5  static int height;
6  public:
7  int length ,breadth;
8
9      area_box(int l,int b){
10         length=l;
11         breadth=b;
12     }
13
14     static int getheight(){
15         cout<<"Enter the value of height\n";
16         cin>>height;
17         return height;
18     }
19     void area(){
20         cout<<"The surface area of the box is: "<<2*((length*breadth)+(breadth*height)+(height*length));
21     }
22 };
23
main*
Ln 35, Col 5  Spaces: 4  UTF-8  CRLF  C++  Win32
8:57 AM 30-Oct-21
```

```
5.cpp
Assignment_2 > 5.cpp > main()
24 int area_box::height=0;
25
26 int main(){
27     // 1st object
28     area_box b1(2,1);
29     b1.getheight();
30     b1.area();
31     // 2nd object
32     area_box b2(3,4);
33     b1.getheight();
34     b1.area();
35
36     return 0;
37 }
```

Activate Windows
Go to Settings to activate Windows.

OUTPUT :

A screenshot of the Visual Studio Code interface. The top menu bar includes File, Edit, Selection, View, Go, Run, Terminal, and Help. The title bar shows '5.cpp - Lab - Visual Studio Code'. The left sidebar has icons for Explorer, Search, and Run and Debug. The main area is the 'TERMINAL' tab, showing a Windows PowerShell session. The prompt is 'PS C:\Users\sai\Desktop\Lab>'. The user enters 'cd "c:\Users\sai\Desktop\Lab\Assignment_2\" ; if (\$?) { g++ 5.cpp -o 5 } ; if (\$?) { .\5 }'. The program prompts 'Enter the value of height', the user enters '32', and the program outputs 'The surface area of the box is: 196'. The user enters '20', and the program outputs 'The surface area of the box is: 124'. The prompt returns to 'PS C:\Users\sai\Desktop\Lab\Assignment_2>'. The status bar at the bottom shows 'main*', 'Ln 30, Col 8', 'Spaces: 4', 'UTF-8', 'CRLF', 'C++', 'Win32', and an 'Activate Windows' watermark.

6. Define a class String that could work as a user-defined string type. Include constructors that will enable us to create an uninitialized string

```
String s1; //
```

string with length 0 and also to initialize an object with a string constant at the time of creation like

```
String s2("Well done!");
```

Include a function that adds two strings to make a third string. Note that the Statement

```
s2= s1;
```

will be perfectly reasonable expression to copy one string to another.

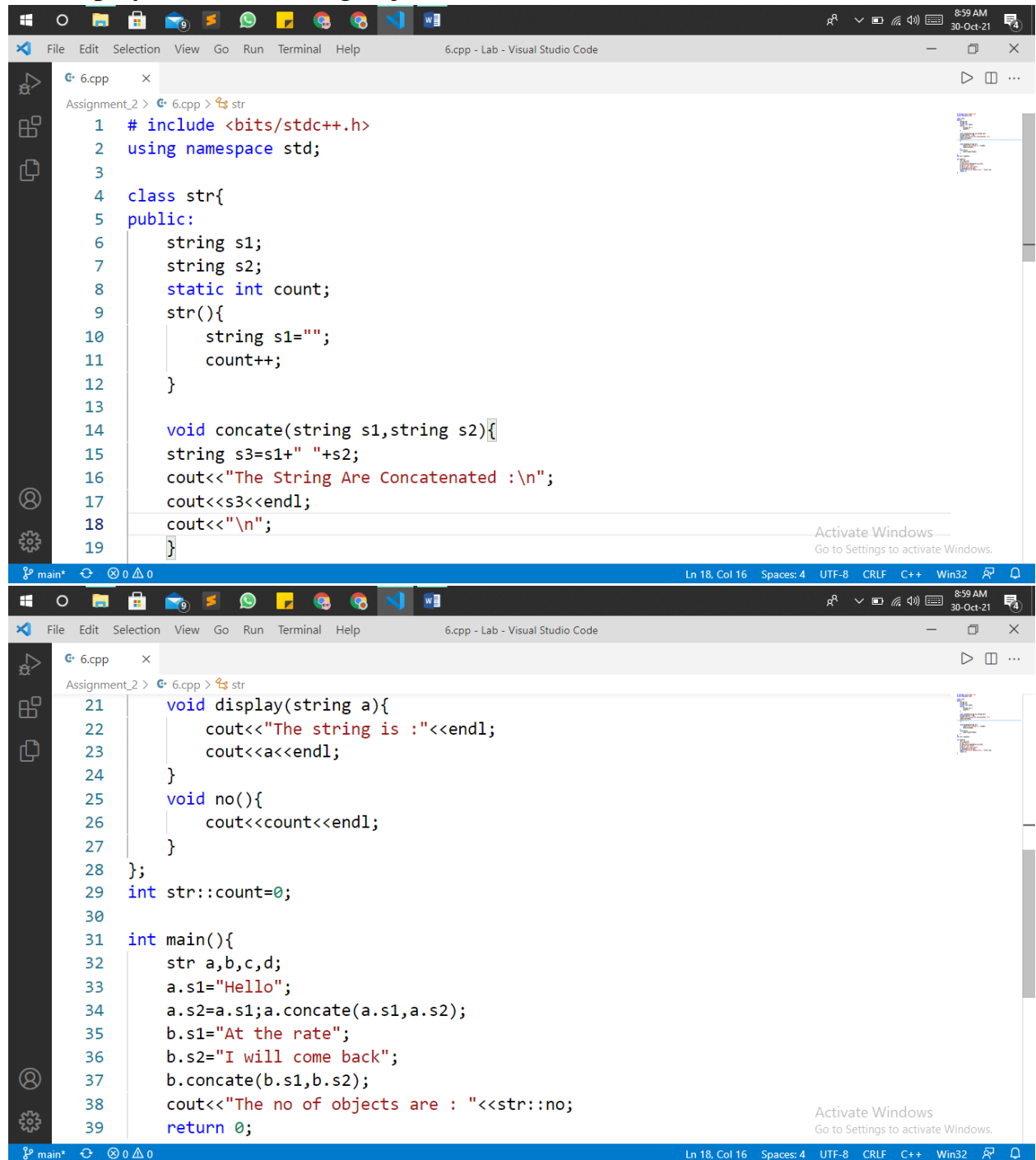
Write a complete program to test your class to see that it does the following tasks:

- (a) Creates uninitialized string objects.

(b) Creates objects with string constants.

(c) Concatenates two strings properly.

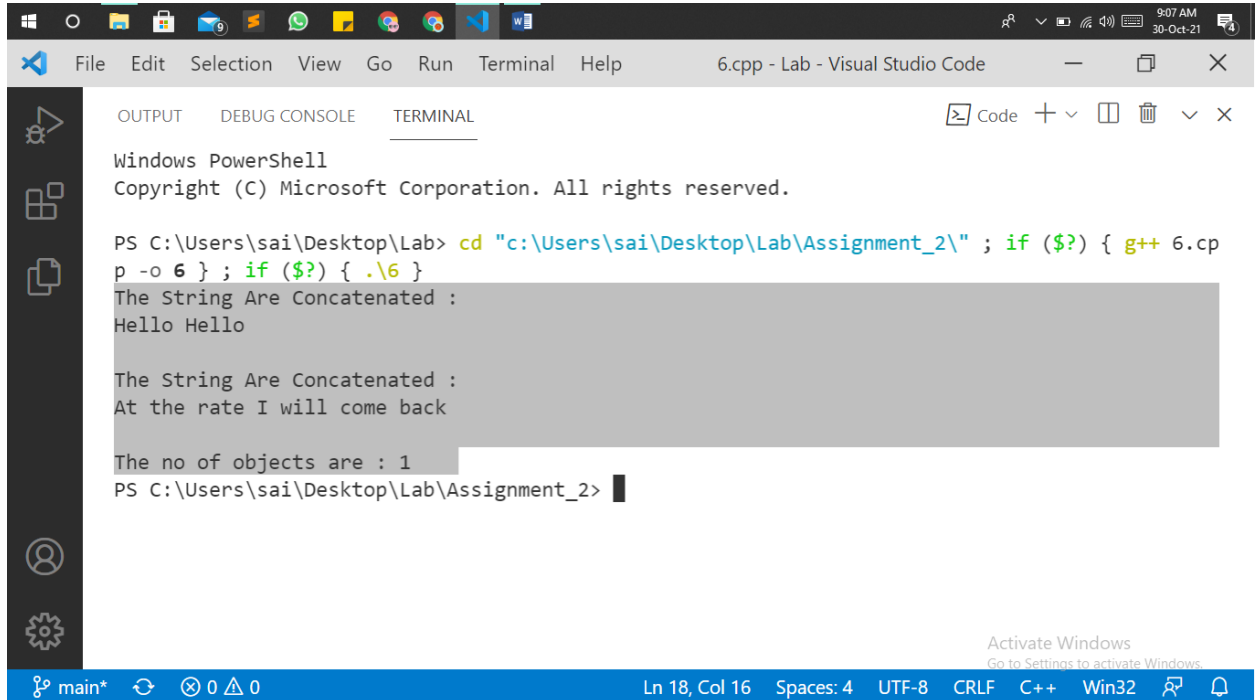
(d) Displays a desired string object. **PROGRAM :**



The image shows two screenshots of a Visual Studio Code editor window. The top screenshot displays the first part of a C++ program (lines 1-19) defining a class 'str' with attributes 's1', 's2', and a static 'count'. It includes a constructor and a 'concat' method. The bottom screenshot displays the second part of the program (lines 21-39), including a 'display' method, a 'no' method, and the 'main' function which creates objects 'a' and 'b', concatenates strings, and prints the number of objects.

```
1  #include <bits/stdc++.h>
2  using namespace std;
3
4  class str{
5  public:
6      string s1;
7      string s2;
8      static int count;
9      str(){
10         string s1="";
11         count++;
12     }
13
14     void concat(string s1,string s2){
15         string s3=s1+" "+s2;
16         cout<<"The String Are Concatenated :\n";
17         cout<<s3<<endl;
18         cout<<"\n";
19     }
20
21     void display(string a){
22         cout<<"The string is : "<<endl;
23         cout<<a<<endl;
24     }
25     void no(){
26         cout<<count<<endl;
27     }
28 };
29 int str::count=0;
30
31 int main(){
32     str a,b,c,d;
33     a.s1="Hello";
34     a.s2=a.s1;a.concat(a.s1,a.s2);
35     b.s1="At the rate";
36     b.s2="I will come back";
37     b.concat(b.s1,b.s2);
38     cout<<"The no of objects are : "<<str::no;
39     return 0;
```

OUTPUT :



The screenshot shows the Visual Studio Code interface with a terminal window open. The terminal displays the output of a C++ program. The program's logic is as follows: it checks if the number 6 is greater than 0. If true, it concatenates the string "Hello " with the number 6 and prints it. Then, it checks if the number 6 is less than 0. If true, it concatenates the string "At the rate I will come back " with the number 6 and prints it. Finally, it prints the number of objects created, which is 1. The terminal output matches this logic.

```
Windows PowerShell
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PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\Lab\Assignment_2\" ; if ($?) { g++ 6.cpp -o 6 } ; if ($?) { .\6 }
The String Are Concatenated :
Hello Hello

The String Are Concatenated :
At the rate I will come back

The no of objects are : 1
PS C:\Users\sai\Desktop\Lab\Assignment_2>
```

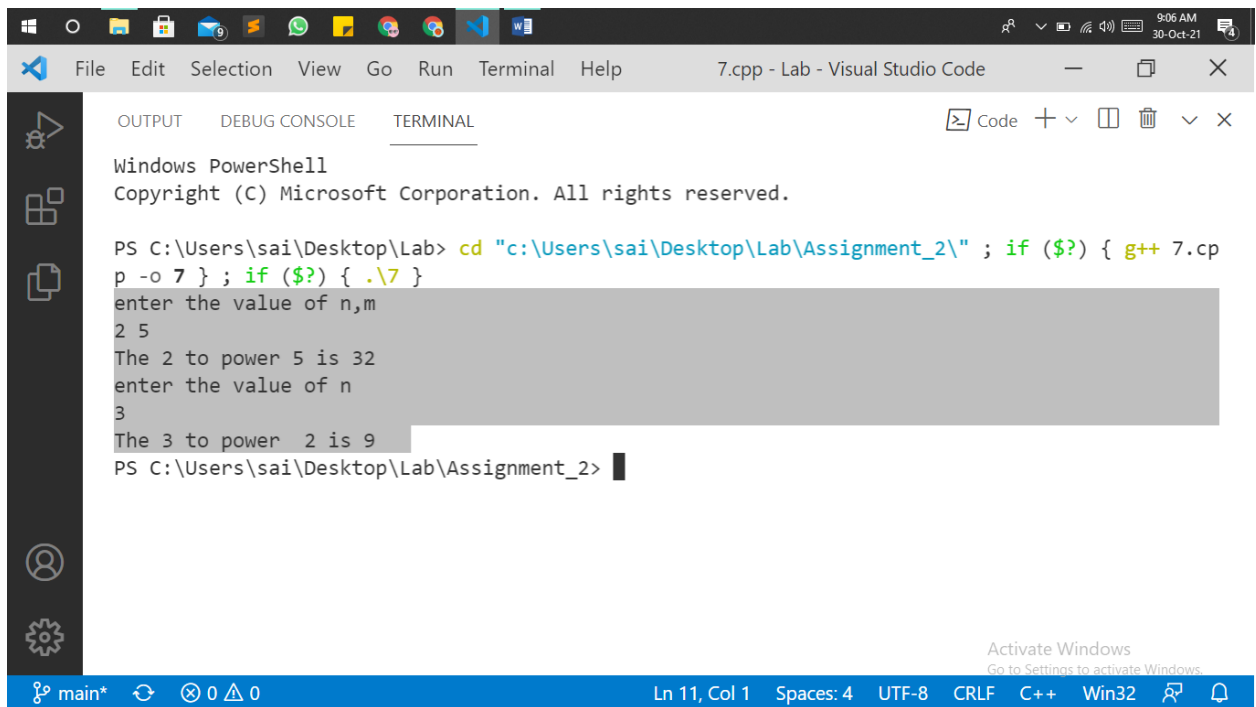
7. Write a function power to raise a number m to a power n. The function takes a double value for m and int value for n and returns the result correctly. Use a default value of 2 for n to make the function to calculate squares when this argument is omitted. Write a function that performs the operation as above but asks an int value for m. Both the functions should have the same name. Write a main that calls both the functions. Use the concept of function overloading.

***Program**

```
7.cpp
Assignment_2 > 7.cpp > ...
1  # include <bits/stdc++.h>
2  using namespace std;
3
4  void power(int n,int m){
5      cout<<"The "<<n<<" to power "<<m<<" is "<<pow(n,m)<<endl;
6  }
7
8  void power(int n){
9      cout<<"The "<<n<<" to power "<<" 2 is "<<pow(n,2)<<endl;
10 }
11
12 int main(){
13     int n,m;
14     // for the two arguments
15     cout<<"enter the value of n,m"<<endl;
16     cin>>n>>m;
17     power(n,m);
18     // for only one arguments
19     cout<<"enter the value of n"<<endl;
```

```
7.cpp
Assignment_2 > 7.cpp > ...
7
8  void power(int n){
9      cout<<"The "<<n<<" to power "<<" 2 is "<<pow(n,2)<<endl;
10 }
11
12 int main(){
13     int n,m;
14     // for the two arguments
15     cout<<"enter the value of n,m"<<endl;
16     cin>>n>>m;
17     power(n,m);
18     // for only one arguments
19     cout<<"enter the value of n"<<endl;
20     cin>>n;
21     power(n);
22     return 0;
23 }
```

OUTPUT :



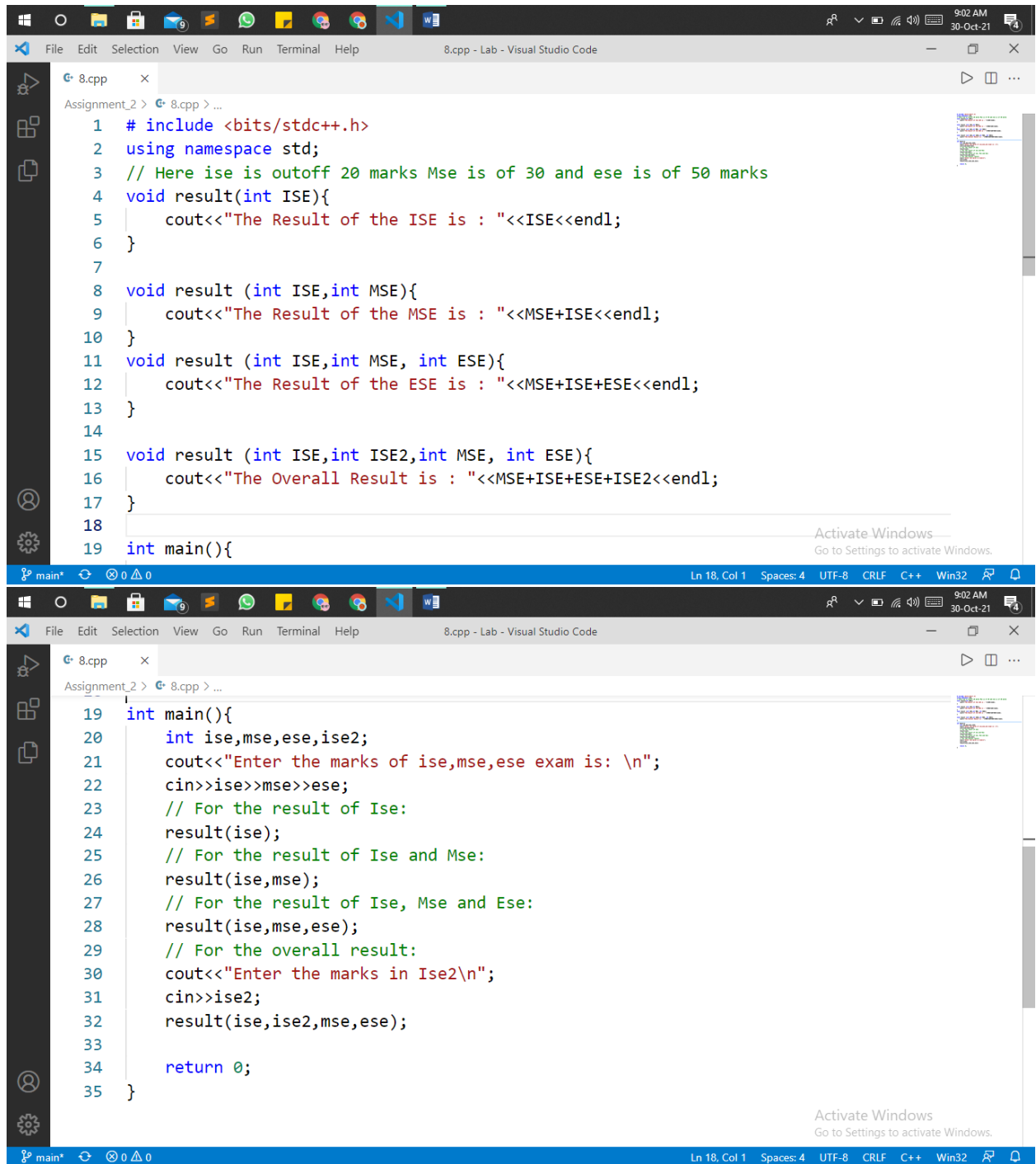
The screenshot shows the Visual Studio Code interface with a terminal window open. The terminal is running a Windows PowerShell session. The user has navigated to the directory `c:\Users\sai\Desktop\Lab\Assignment_2\` and executed a C++ program `7.cpp`. The program prompts the user to enter the value of `n` and `m`. The user enters `2` for `n` and `5` for `m`, and the program outputs `The 2 to power 5 is 32`. The user then enters `3` for `n` and `2` for `m`, and the program outputs `The 3 to power 2 is 9`. The terminal window is titled `7.cpp - Lab - Visual Studio Code`. The status bar at the bottom shows `main*`, `Ln 11, Col 1`, `Spaces: 4`, `UTF-8`, `CRLF`, `C++`, and `Win32`.

```
Windows PowerShell
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PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\Lab\Assignment_2\" ; if ($?) { g++ 7.cpp -o 7 } ; if ($?) { .\7 }
enter the value of n,m
2 5
The 2 to power 5 is 32
enter the value of n
3
The 3 to power 2 is 9
PS C:\Users\sai\Desktop\Lab\Assignment_2>
```

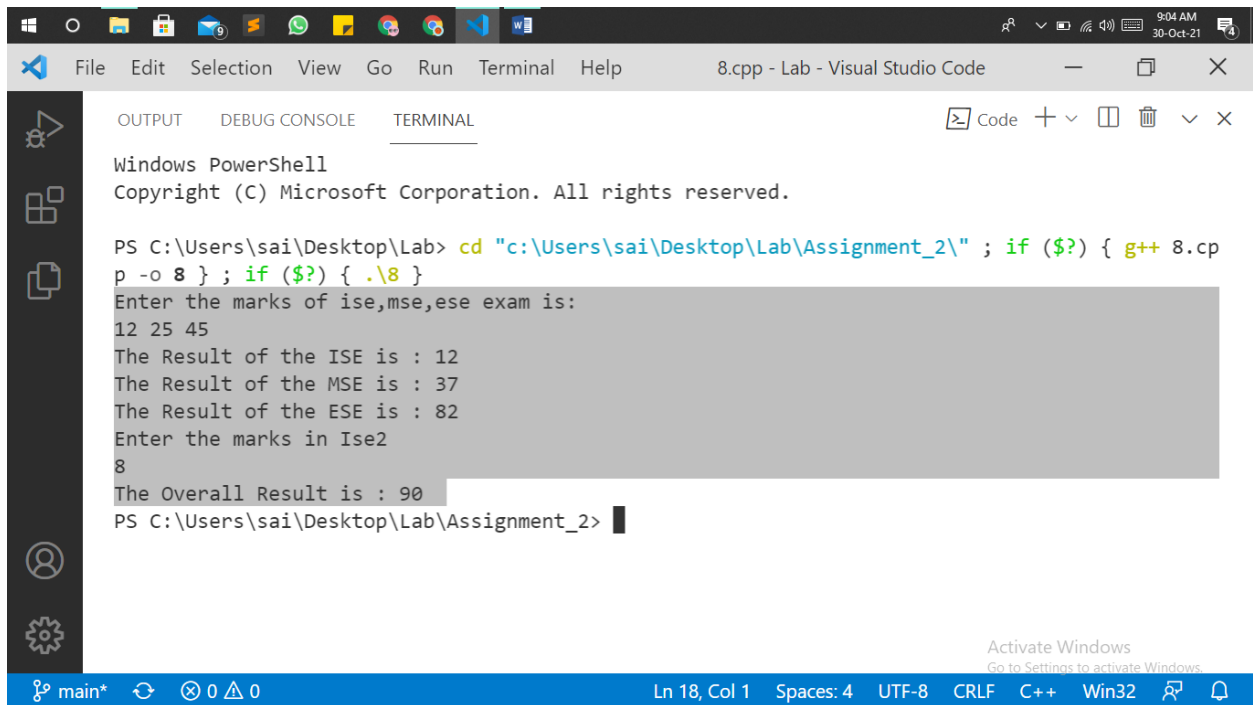
8. Write a program to calculate result of student based on his/her marks. Display the result. Use concept of function overloading. (Result of Internal exam, Mid sem exam, End sem exam and Final consolidated result) function name should beresult.

PROGRAM:



```
1 #include <bits/stdc++.h>
2 using namespace std;
3 // Here ise is outoff 20 marks Mse is of 30 and ese is of 50 marks
4 void result(int ISE){
5     cout<<"The Result of the ISE is : "<<ISE<<endl;
6 }
7
8 void result (int ISE,int MSE){
9     cout<<"The Result of the MSE is : "<<MSE+ISE<<endl;
10 }
11 void result (int ISE,int MSE, int ESE){
12     cout<<"The Result of the ESE is : "<<MSE+ISE+ESE<<endl;
13 }
14
15 void result (int ISE,int ISE2,int MSE, int ESE){
16     cout<<"The Overall Result is : "<<MSE+ISE+ESE+ISE2<<endl;
17 }
18
19 int main(){
20     int ise,mse,ese,ise2;
21     cout<<"Enter the marks of ise,mse,ese exam is: \n";
22     cin>>ise>>mse>>ese;
23     // For the result of Ise:
24     result(ise);
25     // For the result of Ise and Mse:
26     result(ise,mse);
27     // For the result of Ise, Mse and Ese:
28     result(ise,mse,ese);
29     // For the overall result:
30     cout<<"Enter the marks in Ise2\n";
31     cin>>ise2;
32     result(ise,ise2,mse,ese);
33
34     return 0;
35 }
```

OUTPUT:



The image shows a Visual Studio Code window with a terminal open. The terminal is running a Windows PowerShell session. The user has navigated to the directory `c:\Users\sai\Desktop\Lab\Assignment_2\` and executed a C++ program `8.cpp`. The program prompts the user to enter marks for ISE, MSE, and ESE exams. The user has entered the marks 12, 25, and 45. The program then calculates the overall result, which is 90.

```
Windows PowerShell
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PS C:\Users\sai\Desktop\Lab> cd "c:\Users\sai\Desktop\Lab\Assignment_2\" ; if ($?) { g++ 8.cpp -o 8 } ; if ($?) { .\8 }
Enter the marks of ise,mse,ese exam is:
12 25 45
The Result of the ISE is : 12
The Result of the MSE is : 37
The Result of the ESE is : 82
Enter the marks in Ise2
8
The Overall Result is : 90
PS C:\Users\sai\Desktop\Lab\Assignment_2>
```

Visual Studio Code interface details: The top bar shows the file name `8.cpp - Lab - Visual Studio Code`. The left sidebar contains icons for Explorer, Search, and Run and Debug. The bottom status bar shows the current file is `main*`, line 18, column 1, with 4 spaces, UTF-8 encoding, CRLF line endings, C++ language, and Win32 architecture.