San Francisco Bay University

CS360L - Programming in C and C++ Lab
Lab Assignment #2

Due day: 2/27/2024

Instruction:

1. **Push the answer sheets/source code to Github**
2. **Please follow the code style rule like programs on handout.**
3. **Overdue lab assignment submission can't be accepted.**
4. **Take academic honesty and integrity seriously (Zero Tolerance of Cheating & Plagiarism)**

1. Given a *student* class with the members and methods as follows, write a C++ test program (a.k.a. main function) to display *names*, *courseNum* and grades of *3* students who have appeared in the examination. Declare the class of *name*, *courseNum*. and *grade*. Create an array of class objects. Read and display the contents of the array.

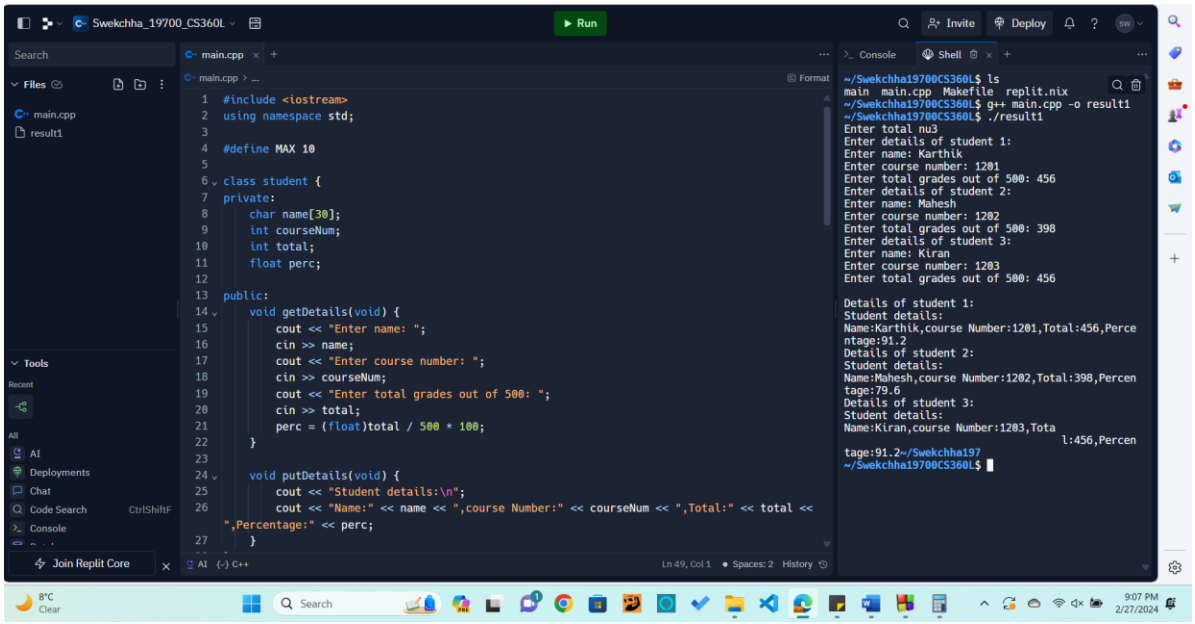
```
#include <iostream>

using std::cout;
using std::cin;

#define MAX 10

class student {
  private:
    char name[30];
    int courseNum;
    int total;
    float perc;
  public:
    void getDetails(void); //member function to get
student's details
    void putDetails(void); //member function to print
student's details
};
void student:: getDetails(void) //member function
definition, outside of the class
{
  cout << "Enter name: " ;
  cin >> name;
  cout << "Enter course number: ";
```

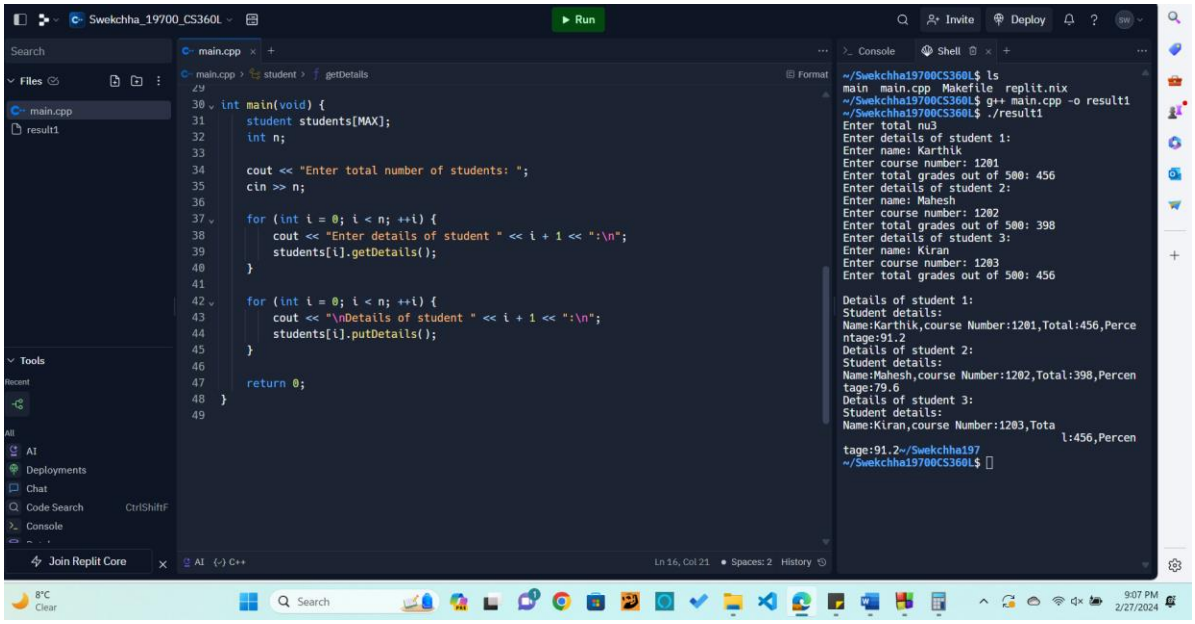
```
  cin >> courseNum;
  cout << "Enter total grades out of 500: ";
  cin >> total;
  perc=(float)total/500*100;
}
void student:: putDetails(void) //member function
definition, outside of the class
{
  cout << "Student details:\n";
  cout << "Name:"<< name << ",course Number:" << courseNum
<< ",Total:" << total << ",Percentage:" << perc;
}

int main(void){
 //Write your program here

   return 0;
}
```

Output

```
Enter total number of students: 3
Enter details of student 1:
Enter name: Karthik
Enter course number: 1201
Enter total marks out of 500: 456

Enter details of student 2:
Enter name: Mahesh
Enter course number: 1202
Enter total marks out of 500: 398

Enter details of student 3:
Enter name: Kiran
Enter course number: 1203
Enter total marks out of 500: 456

Details of student 1:
Student details:
Name: Karthik, course Number: 1201, Total: 456, Percentage:
91.2

Details of student 2:
Student details:
Name: Mahesh, course Number: 1202, Total: 398,
Percentage:79.6

Details of student 3:
```

Student details:
Name: Kiran, course Number: 1203, Total: 456, Percentage: 91.2
→





```
~/Swekchha19700CS360L$ ./result1
Enter total nu3
Enter details of student 1:
Enter name: Karthik
Enter course number: 1201
Enter total grades out of 500: 456
Enter details of student 2:
Enter name: Mahesh
Enter course number: 1202
Enter total grades out of 500: 398
Enter details of student 3:
Enter name: Kiran
Enter course number: 1203
Enter total grades out of 500: 456

Details of student 1:
Student details:
Name:Karthik,course Number:1201,Total:456,Percentage:91.2
Details of student 2:
Student details:
Name:Mahesh,course Number:1202,Total:398,Percentage:79.6
Details of student 3:
Student details:
Name:Kiran,course Number:1203,Tota
      l:456,Percentage:91.2~/Swekchha197
~/Swekchha19700CS360L$
```

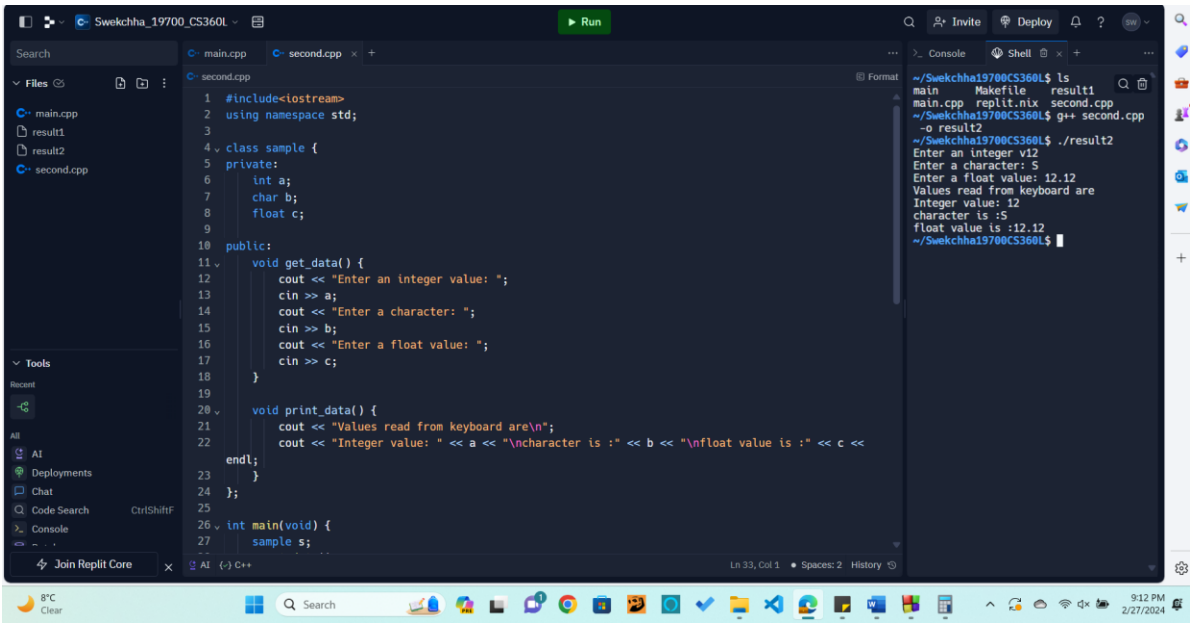
2. Complete two methods, *get_data()* and *print_data()* within the given class *sample* based on the running results shown as below

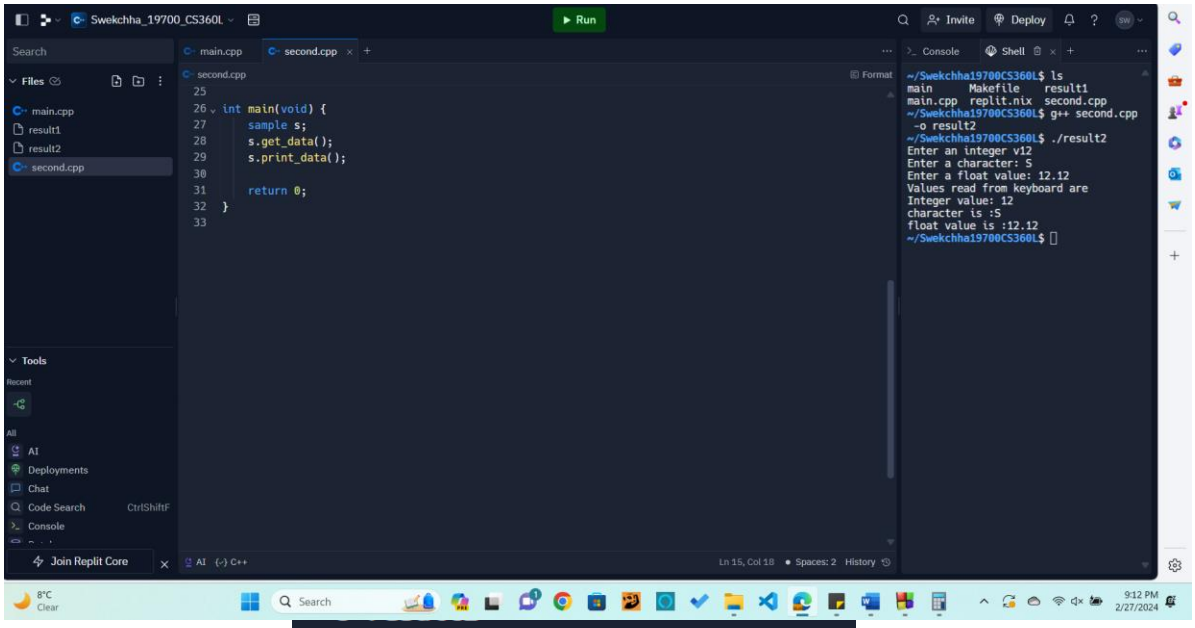
```
#include<iostream>

using std::cout;
using std::cin;
using std::endl;

class sample{
  private:
    int a;
    char b;
    float c;

  public:
    void get_data(){
      //Write your program here
    }
    void print_data(){
      //Write your program here
```

```
    }
};
int main(void){
  sample s;
  s.get_data();
  s.print_data();

  return 0;
}
```

Output

```
Enter an integer value:12
Enter a character: S
Enter a float value: 12.12
Values read from keyboard are
Integer value: 12
character is :S
float value is :12.12
→
```






```
~/Swekchha19700CS360L$ ./result2
Enter an integer v12
Enter a character: S
Enter a float value: 12.12
Values read from keyboard are
Integer value: 12
character is :S
float value is :12.12
~/Swekchha19700CS360L$
```

3. Write a class called *`Rectangle`* that has floating point data members' *`length`* and *`width`*. The class has the following member functions: *`void setLength(float)`* to set the *`length`* data member; *`void setwidth(float)`*to set the *`width`* data member; *`float perimeter(void)`*to calculate and return the perimeter of the rectangle; *`float area(void)`*to calculate and return the area of the rectangle; *`void show(void)`*to display the *`length`* and *`width`* of the rectangle; *`int sameArea(Rectangle)`*that has one parameter of type *`Rectangle`*, and *`sameArea`* returns *`1`* if the two *`Rectangles`* have the same area, otherwiese returns *`0`* if they don't.

    a. Create *`Rectangle`* class first

```
class Rectangle {
private:
    float length;
    float width;

public:
    void setLength(float l) {
        length = l;
    }

    void setWidth(float w) {
        width = w;
    }

    float perimeter() {
        return 2 * (length + width);
    }

    float area() {
        return length * width;
    }

    void show() {
        cout << "Length: " << length << ", Width: " << width << endl;
    }

    int sameArea(Rectangle r) {
        return area() == r.area();
```

b. Write *main* function to create two *rectangle* objects. Set the *length* and *width* of the first rectangle to *5* and *2.5*, and set the *length* and *width* of the second rectangle to *5* and *18.9*. Display each *rectangle* and its area and perimeter.

→

```
int main() {
    Rectangle r1, r2, r3;
    r1.setLength(5);
    r1.setWidth(2.5);
    r2.setLength(5);
    r2.setWidth(18.9);
    r3.setLength(15);
    r3.setWidth(6.3);
```

c. Check whether the two *Rectangles* have the same area and print a message indicating the result. Set the *length* and *width* of the first *rectangle* to *15* and *6.3*. Display each *Rectangle* and its area and perimeter again. Again, verify whether the two *Rectangles* have the same area and print a message indicating the result

→

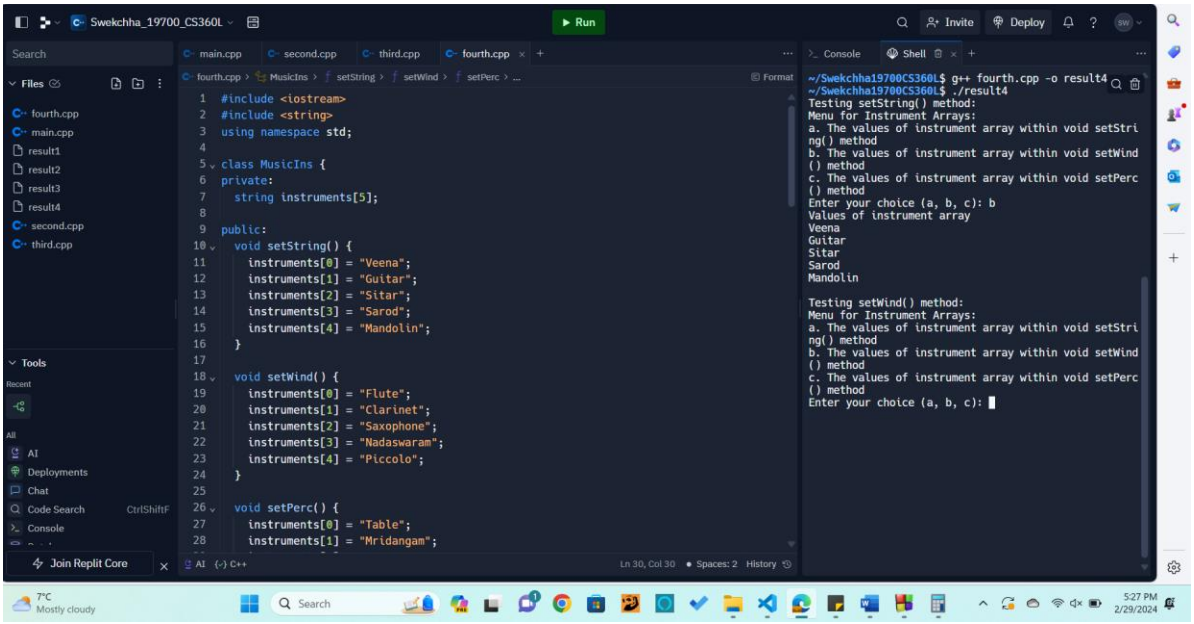
```
cout << "Rectangles 1 and 2 have the same area: " << (r1.sameArea(r2) ? "Yes" : "No") << endl;
cout << "Rectangles 1 and 3 have the same area: " << (r1.sameArea(r3) ? "Yes" : "No") << endl;
```

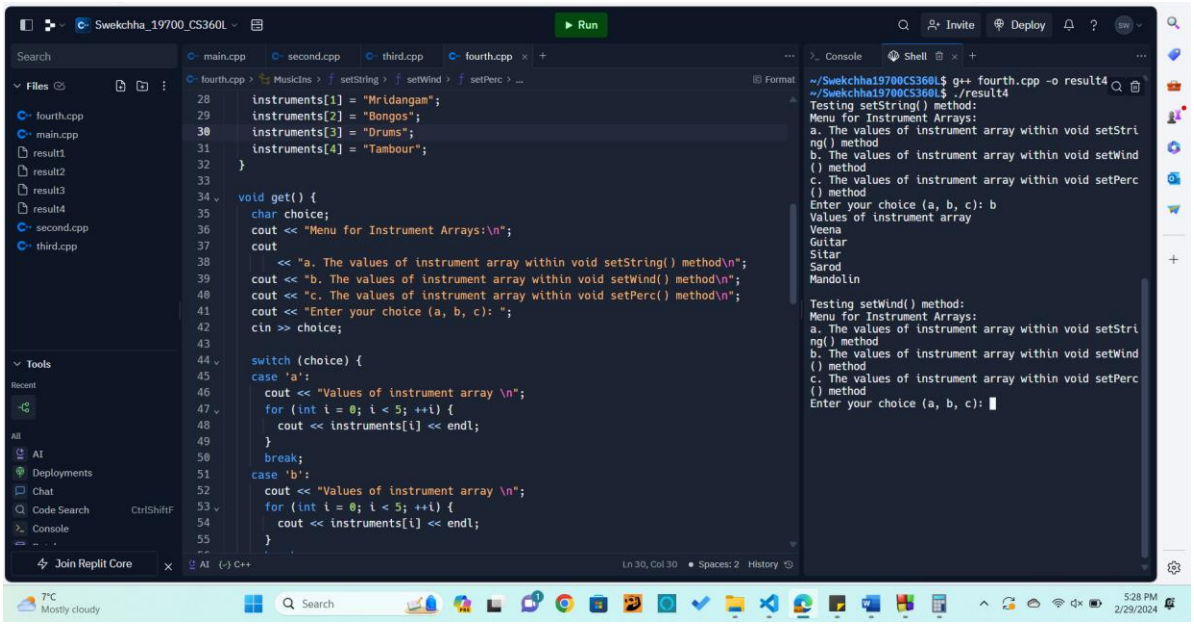
```
Rectangle 1:
Length: 5, Width: 2.5
Area: 12.5, Perimeter: 15
Rectangle 2:
Length: 5, Width: 18.9
Area: 94.5, Perimeter: 47.8
Rectangle 3:
Length: 15, Width: 6.3
Area: 94.5, Perimeter: 42.6
Rectangles 1 and 2 have the same
area: No
Rectangles 1 and 3 have the same
area: No
```

4. Create a class called *MusicIns* to contain three methods *void string(void), void wind(void)* and *void perc(void)*. Each of these methods should initialize a member *string* type *instrument* array to contain the following
    a. *Veena, guitar, sitar, sarod* and *mandolin* under *void string(void)* method
    b. *Flute, clarinet, saxophone, nadaswaram* and *piccolo* under *void wind(void)* method
    c. *Table, mridangam, bongos, drums* and *tambour* under *void perc(void)* method

    It should also have two methods called *void get(void)* and *void show(void)* to display the contents of the arrays initialized. The *void get(void)* methods must display a menu as follows
    a. The values of *instrument* array within *void string(void)* method
    b. The values of *instrument* array within *void wind(void)* method
    c. The values of *instrument* array within *void perc(void)* method

    After that, generate test program *main.cpp* to verify the above class
    →


Swekchha_19700_CS360L
Run
Invite
Deploy
Search
main.cpp
second.cpp
third.cpp
fourth.cpp
Files
fourth.cpp
main.cpp
result1
result2
result3
result4
second.cpp
third.cpp
Tools
Recent
All
AI
Deployments
Chat
Code Search CtrlShiftF
Console
Join Replit Core
fourth.cpp > MusicIns > setString > setWind > setPerc > ...
Format
#include <iostream>
#include <string>
using namespace std;
class MusicIns {
private:
string instruments[5];
public:
void setString() {
instruments[0] = "Veena";
instruments[1] = "Guitar";
instruments[2] = "Sitar";
instruments[3] = "Sarod";
instruments[4] = "Mandolin";
}
void setWind() {
instruments[0] = "Flute";
instruments[1] = "Clarinet";
instruments[2] = "Saxophone";
instruments[3] = "Nadaswaram";
instruments[4] = "Piccolo";
}
void setPerc() {
instruments[0] = "Table";
instruments[1] = "Mridangam";
AI
(-) C++
Ln 30, Col 30
Spaces: 2
History
Console
Shell
~/Swekchha19700CS360L$ g++ fourth.cpp -o result4
~/Swekchha19700CS360L$ ./result4
Testing setString() method:
Menu for Instrument Arrays:
a. The values of instrument array within void setString() method
b. The values of instrument array within void setWind() method
c. The values of instrument array within void setPerc() method
Enter your choice (a, b, c): b
Values of instrument array
Veena
Guitar
Sitar
Sarod
Mandolin
Testing setWind() method:
Menu for Instrument Arrays:
a. The values of instrument array within void setString() method
b. The values of instrument array within void setWind() method
c. The values of instrument array within void setPerc() method
Enter your choice (a, b, c):
7°C
Mostly cloudy
Search
5:27 PM
2/29/2024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Code Search CtrlShiftF
Console
Join Replit Core
fourth.cpp > MusicIns > setString > setWind > setPerc > ...
Format
instruments[1] = "Mridangam";
instruments[2] = "Bongos";
instruments[3] = "Drums";
instruments[4] = "Tambour";
}
void get() {
char choice;
cout << "Menu for Instrument Arrays:\n";
cout
<< "a. The values of instrument array within void setString() method\n";
cout << "b. The values of instrument array within void setWind() method\n";
cout << "c. The values of instrument array within void setPerc() method\n";
cout << "Enter your choice (a, b, c): ";
cin >> choice;
switch (choice) {
case 'a':
cout << "Values of instrument array \n";
for (int i = 0; i < 5; ++i) {
cout << instruments[i] << endl;
}
break;
case 'b':
cout << "Values of instrument array \n";
for (int i = 0; i < 5; ++i) {
cout << instruments[i] << endl;
}
AI
(-) C++
Ln 30, Col 30
Spaces: 2
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Enter your choice (a, b, c): b
Values of instrument array
Veena
Guitar
Sitar
Sarod
Mandolin
Testing setWind() method:
Menu for Instrument Arrays:
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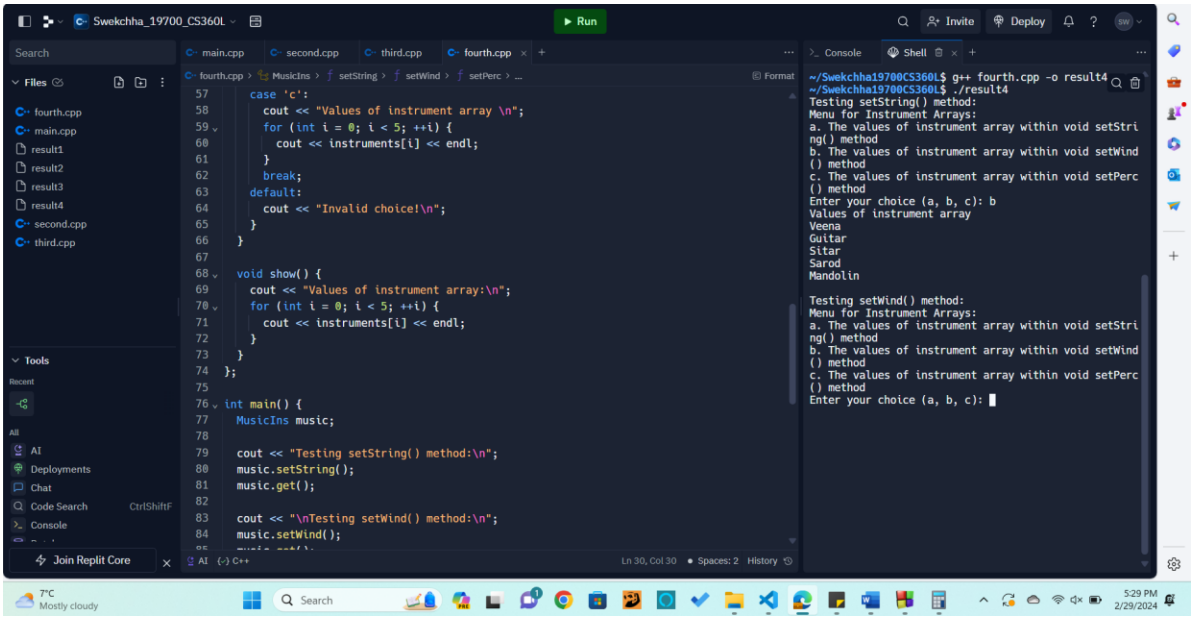
b. The values of instrument array within void setWind() method
c. The values of instrument array within void setPerc() method
Enter your choice (a, b, c):
7°C
Mostly cloudy
Search
5:28 PM
2/29/2024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~/Swekchha19700CS360L$ ./result4
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a. The values of instrument array within void setString() method
b. The values of instrument array within void setWind() method
c. The values of instrument array within void setPerc() method
Enter your choice (a, b, c): b
Values of instrument array
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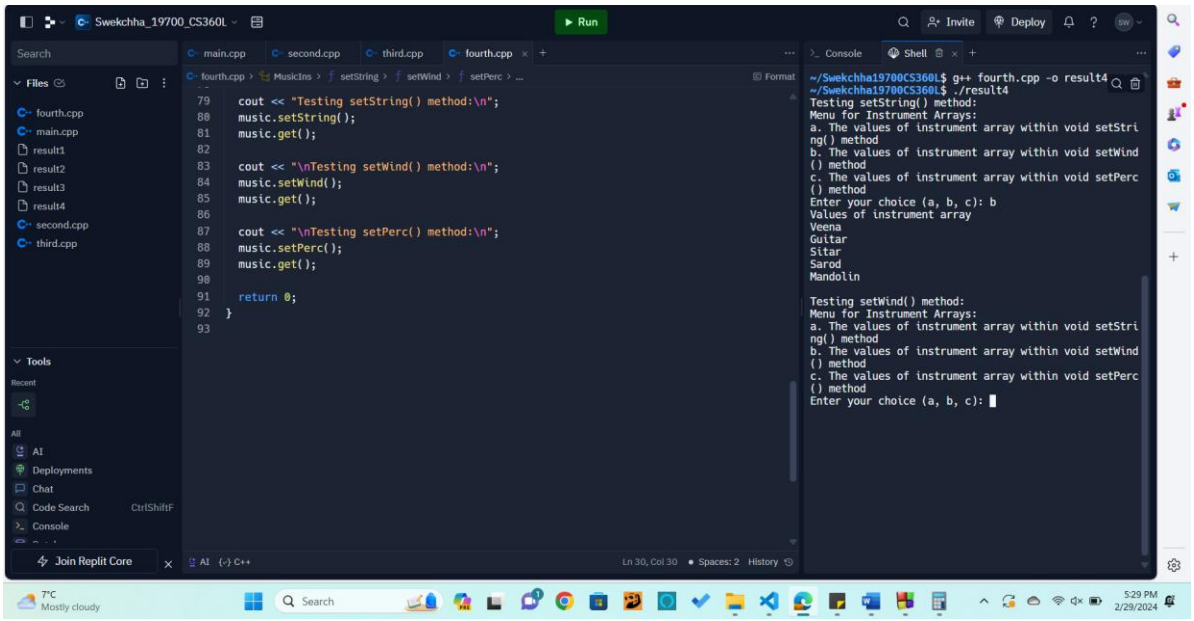
Guitar
Sitar
Sarod
Mandolin
Testing setWind() method:
Menu for Instrument Arrays:
a. The values of instrument array within void setString() method
b. The values of instrument array within void setWind() method
c. The values of instrument array within void setPerc() method
Enter your choice (a, b, c):
Ln 30, Col 30
Spaces: 2
History
7°C
Mostly cloudy
Search
5:29 PM
2/29/2024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b. The values of instrument array within void setWind() method
c. The values of instrument array within void setPerc() method
Enter your choice (a, b, c):
Ln 30, Col 30
Spaces: 2
History
7°C
Mostly cloudy
Search
5:29 PM
2/29/2024

```
Testing setString() method:
Menu for Instrument Arrays:
a. The values of instrument array within void setStri
ng() method
b. The values of instrument array within void setWind
() method
c. The values of instrument array within void setPerc
() method
Enter your choice (a, b, c): b
Values of instrument array
Veena
Guitar
Sitar
Sarod
Mandolin
```