University of Central Punjab

Faculty of Information Technology

Final-Term Exam Fall - 2021
Object Oriented Programming– Lab

Instructions for Invigilators:

1. Students will have 110 minutes to finish the whole exam. It is up to the students to manage their time. **After 110 minutes, last 10 minutes are given for the submission.** So total time is 120 minutes (110 minutes to solve the exam + 10 minutes for the submission).

Instructions for Students:

1. Please create file with appropriate name
2. Submit only **.h** and **.cpp** files.
3. Late submissions will **NOT** be considered
4. Create as many classes and functions as required. Remember one function for one functionality.
5. Take care, plagiarism will not be tolerated at any case.
6. **No .RAR** files are accepted
7. The paper is close book and close notes. No cheat sheet allowed.
8. Use meaningful variable names, take care of naming conventions and indentation. **5 Marks will be deducted for each thing if not followed.**
9. Everything that could be constant, should be constant.
10. Format of the name of your submission should be *RegisterionNumber_Name_Course_Section*.
    For eg: ***L1F13BSCS2124_MBilalIshfaq_OOP_SEC_E***

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Question 1 – 60 Marks

Let's create a ship agency application. Mr. Bilal is a ship broker and he has different types of ships for trading and travelling system. He is responsible for handling shipments and cargo and the general interests of its custom ports and harbours worldwide, on behalf of ship owners, managers and charterers.

Try to understand his business criteria for this create a Ship that includes different attributes and methods such as:

- Name of the ship (char *)
- Year when that ship was built (Date) **Hint:** *Create your own Date class*
- Setter and getter methods for all attributes
- Display method that displays Ship's information

After this create a CruiseShip class that inherits from the Ship class. It also includes following attributes and methods:

- Number of Passengers (int)
- Display method that display only the ship's name and total number of passengers

Create one more class called ContainerShip. This class includes following data:

- capacity for mass that will be loaded into the ship (double)
- Again override Display method that displays information of this particular class.

Once you have created the code for all above classes, implement a ShipFactory class using Factory Design Pattern which will be responsible of creating both the type of ships on user's requests.

Implementation in main():

- Create a Ship array of size 8.
- Assign objects of both types of Ships to the array through factory class.
- Display the details of all ships created.

Submit the screen shot of your output as well. It carries marks.

Requirements:

- No global variables!
- All data members of your classes must be private
- Use the const qualifier on member functions wherever it is appropriate.
- Using string data type is not allowed (use char*)
- Use of built-in functions is not allowed.
- Your programme should not be able to make object of Base class Car
- The code for this program should be portable. Test on compiler on sufficient test cases before submitting

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Question 2 – 60 Marks

A main() function is given below. Based on this function, your task is to write complete template based code **required** to run the main() function successfully and produce the exact output given. **You are not allowed to return any memory handler in your code.**

For your ease, a file containg main() function is also uploaded . You can directly use it without writing on your own.

Remember:

1. **You cannot change anything in the main() function and should produce the exact output given.**
2. **If your code will not be able to compile, you will not be awarded more than 50% marks whether you have written the whole code.**
3. **Submit the screen shot of your output as well. It carries marks.**

```
int main()
{
    MyArray<char> arr1;// make a default array of 100 size
    arr1.add('[');//insert at position 1 or index 0
    arr1.add('A');//insert at position 2 or index 1
    arr1.add('B');//insert at position 3 or index 2
    arr1.add('C');//insert at position 4 or index 3
    arr1.add('D');//insert at position 5 or index 4
    arr1.add(']');//insert at position 6 or index 5

    cout << "arr1\n";
   print(arr1);
    cout << "Lenghth of arr1 is = " << arr1.length() << endl;

   arr1.clear();//It should clear the array by placing null char at all indexes and
setting count to zero
    cout << "After clearing arr1\n";
    print(arr1);

    arr1.add('$');
    cout << "After adding $ to arr1\n";
    print(arr1);

    cout << "arr2\n";
    MyArray<int> arr2;
    arr2.add(1);//insert at position 1 or index 0
    arr2.add(2);//insert at position 2 or index 1
   arr2.add(3);//insert at position 3 or index 2
    arr2.add(4);//insert at position 4 or index 3
    arr2.add(5);//insert at position 5 or index 4
    print(arr2);
    cout << "Lenghth of arr2 is =" << arr2.length() << endl;

   MyArray<char> arr3;
   arr3.add('*');
```

```
    arr3 = arr1 + arr3;//It will concatenate both the arrays and assign it to arr3
    cout << "arr3\n";
    print(arr3);

    MyArray <double>arr4(5);//should make an empty array of size 5
    arr4.add(2.5);
    arr4.add(3.5);
    arr4.add(6.5);
    arr4.add(7.5);
    cout << "arr4\n";
    print(arr4);

    arr4[0] = arr4[1] + 2.0; //should add 2.0 to the element at 1st index and
assign it to 0th index
    print(arr4);
    print(arr4++);//post-increment
    print(++arr4);//pre-increment
    print(--arr4);//pre-decrement
    print(arr4--);//post-decrement


    return 0;

}
```

Output:

```
C:\WINDOWS\system32\cmd.exe
arr1
[ A B C D ]
Lenghth of arr1 is = 6
After clearing arr1
Array is empty.
After adding $ to arr1
$
arr2
1 2 3 4 5
Lenghth of arr2 is =5
arr3
$ *
arr4
2.5 3.5 6.5 7.5
5.5 3.5 6.5 7.5
5.5 3.5 6.5 7.5
7.5 5.5 8.5 9.5
6.5 4.5 7.5 8.5
6.5 4.5 7.5 8.5
Press any key to continue . . .
```