CSL304- IOOM - Object Oriented Programming

Lab Assignment – 5 Batch R1

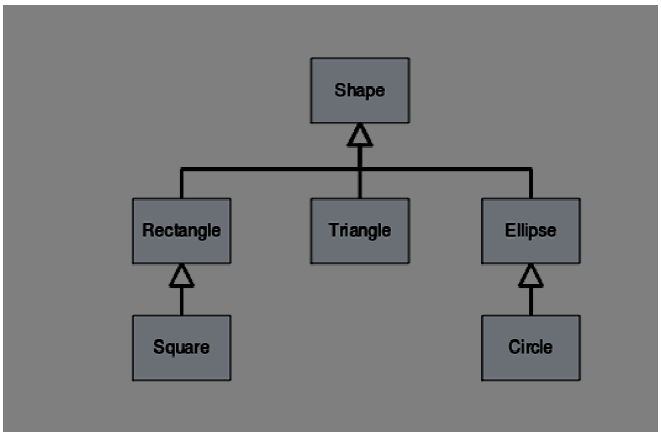
Evaluation: Monday October 8, 2018, at 2.00 PM

Note:

i) Input should be taken only from the user and not hard coded.
ii) You need to make all data members either private or protected.
iii) Make all methods either public or default.
iv) Define appropriate constructors, destructors, setters and getters in particular classes.

Batch R1

1. Consider the hierarchy of shapes in the adjoining figure.



Declare the following two methods in each class:

- span(): returns the longest distance across the shape.
- area():the shape's area.

Let both these methods be pure virtual functions in the base class(shape). Provide the respective implementation of these methods for each derived shape by using the below specified (protected) data members:

- *Rectangle*: length, width
- *Square*: side
- *Triangle*: side1, side2, side3
- *Ellipse*: minor_axis, major_axis
- *Circle*: radius

Also, define data members to suit your requirement. In main method, instantiate one object of each class. Create a vector of pointers of Shape class. Store the references of each of the instantiated object in this vector. Using a loop iterate through this vector to display the respective span and area of each object.

Q2. Consider the following definition:

```
class Array
{
     private:
     int size;
     int A[];
     public:
     Array(int size)
     {
          this.size=size;
          A=new A[size];
     }
     void swap(int i,int j)   //swap element at index i
with element at index in A[]
     {...}
     void sort()
     {...//Implement any sorting algorithm using swap()
method defined here...}

     int find_max()      //find the largest element present
in the array...
     {...}

     ...// include getters setters and display function...
}
```

Create a template for this class, while giving the definitions for each member method using a template variable. Instantiate this class for an *int, long, float* type of elements one by one and invoke the member methods for each object.

Note - Define appropriate constructors, destructors, setters and getters in particular classes.

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Lab Assignment – 5 Batch R2

Evaluation: Monday October 8, 2018, at 3.00 PM

Note:

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iii) Make all methods either public or default.

iv) Define appropriate constructors, destructors, setters and getters in particular classes.

R2 Batch

1. Consider an abstract base class called Car having data members name (name of the Car), type (type of the Car) and methods printName() , printType(). It has 3 children Sedan, SUV and Hatchback, having abstract methods called printMileage(), printPrice(), printPower(), printGroundClearance() respectively. And these are then inherited and overriden by variety of classes. Choose suitable hierarchy from the classes below and imitate the same in C++ code to achieve this.

- i10
- Baleno
- Kwid
- Ignis
- Duster
- Scorpio
- Dzire
- i20
- Vitaara
- WagonR
- Alto

2. Create 3 functions in 3 different custom template classes.

1. sort() : which sorts the array of a generic type T.
2. swap(): which swaps the elements of a generic type T.
3. print(): which prints the array of a generic type T.

Using these, implement it for:

a) Int
b) Float

c) string

To sort (in the natural sorting order using bubble sort logic) via calling appropriate methods from main() as well as within the functions themselves.

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Lab Assignment – 5 Batch R3

Evaluation: Tuesday October 9, 2018, at 2.00 PM

Note:

i) Input should be taken only from the user and not hard coded.
ii) You need to make all data members either private or protected.
iii) Make all methods either public or default.
iv) Define appropriate constructors, destructors, setters and getters in particular classes.

R3 Batch

1. Imagine the same publishing company (Refer to Q3 in Assignment 4 for Batch R3, R4) that markets both book and audiocassette versions of its works. Create a class called publication that stores the title (a string) and price (type float) of a publication. From this class derive two classes: book, which adds a page count (type int); and tape, which adds a playing time in minutes (type float). Each of the three classes should have a getdata() function to get its data from the user at the keyboard, and a putdata() function to display the data.
   Write a main() program function that creates an array of pointers to publication. In a loop, ask the user for data about a particular book or tape, and use new to create an object of type book or tape to hold the data. Put the pointer to the object in the array. When the user has finished entering the data for all books and tapes, display the resulting data for all the books and tapes entered, using a for loop and a single statement such as
   pubarr[j]->putdata();
   to display the data from each object in the array.

2. Here's a simplified Matrix class's definition:

```
class Matrix
{
  private:
    int doubleArray[MAXROWS][MAXCOLS];
    int rows;
    int cols;
 public:
    Matrix();
    void printMatrix();
    void setElement(int row, int col, int value);//set an element of
the matrix
    void setMatrix(int [][MAXCOLS]);//set the doubleArray to what is
sent
```

```
    void addMatrix(int [][MAXCOLS]);//add an array to doubleArray
    void  addMatrix(int  [][MAXCOLS],  int[][MAXCOLS]);//add  two  arrays
together and set the matrix to this resultant matrix
};
```

Create a template for this class, while giving the definitions for each member method using a template variable. Instantiate this class for an *int, long, float* type of elements one by one and invoke the member methods for each object.

CSL304- IOOM - Object Oriented Programming

Lab Assignment – 5 Batch R4

Evaluation: Tuesday October 9, 2018, at 3.00 PM

Note:

i) Input should be taken only from the user and not hard coded.

ii) You need to make all data members either private or protected.

iii) Make all methods either public or default.

Define appropriate constructors, destructors, setters and getters in particular classes.

R4 Batch

1. Create a template class (Stack) for generic type T which creates and returns a dynamically allocated stack object of elements of type T. And following separate Template functions :

- push() : pushes an element of a generic type T onto the provided stack.
- pop() : pops an element of a generic type T from the provided stack.
- print() : prints all the elements of stack.
- isEmpty(): checks for emptiness of the stack.

Using these, Implement a Stack for:

a) int
b) float
c) string

and allow user to dynamically push, pop, print the stack.

2. Consider an abstract base class called Shape having data members name (name of the figure), type (type of the figure) and methods printName() , printType(). It has 2 children 2D and 3D, having abstract methods called calculateArea() and calculateVolume() respectively.

   calculateArea() : Calculates and prints the area of the particular figure.

   calculateVolume() : Calculates and prints the volume of the particular figure.

   And these are then inherited and overridden by variety of classes. Choose suitable hierarchy from the classes below and imitate the same in C++ code to achieve this.

2D

Triangle,

Parrallelogram,

Rectangle,

Rhombus,

Square

Circle

Scalene

Isosceles

3D

Equilateral

Cuboid

Cube

Sphere