National University of Computer and Emerging Sciences

Lab Manual 12
Object Oriented Programming

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1.1 *Objectives*

After completing this lab, you will be able to understand:

1 Constructors and destructors calling sequence.
2 Function Overloading and Overriding
3 Compile time binding.

Task 1:

Define and implement a class Organism in files Organism.h and Organism.cpp, respectively. This class should provide:

- A default constructor which prints "Organism() called" on the Screen.
- A function print() which prints out the specific message on Screen.
- A destructor which prints "~Organism() called" on the screen.

Animal is an organism. Define and implement another class Animal in files Animal.h and Animal.cpp, respectively. This class should provide:

- A default constructor which prints "Animal() called" on the Screen.
- A function print() which prints out the specific message on Screen.
- A destructor which prints "~Animal() called" on the screen.

Mammal is an animal. Define and implement another class Mammal in files Mammal.h and Mammal.cpp, respectively. This class should provide:

- A default constructor which prints "Mammal() called" on the Screen.
- A function print() which prints out the specific message on Screen.
- A destructor which prints "~Mammal() called" on the screen.

Design your **main()** such that your constructors and destructors calling sequence is as per your class hierarchy.

Task 2:
Write a program to calculate the area of following shapes by using

The *base class* "shape" and the *derived classes* are rectangle, triangle, circle, and cylinder. Attributes of all the classes are as under:

shape	rectangle	triangle	circle	Cylinder

protected:
string type;
public:
virtual void area_**calculator**();
	public:
	void area_calculator()
	{
	//definition
	}
	
	void area_calculator(height, width)
	{
	//definition
	}
	
	private:
	float height;
	float width;
		public:
		void area_calculator()
		{
		//definition
		}
		
		void area_calculator(height, base)
		{
		//definition
		}
		
		private:
		float base;
		float height;
			public:
			void area_calculator()
			{
			//definition
			}
			
			void area_calculator(radius)
			{
			//definition
			}
			
			Private:
			float radius;
				public:
				void area_calculator()
				{
				//definition
				}
				
				void area_calculator(radius, height)
				{
				//definition
				}
				
				Private:
				float radius;
				float height;

	Area = Length X Width	Area = 1/2 of the base X the height	$A = \pi r^2$	$2\pi r h + 2\pi r^2$

- Your each class must have overloaded/default constructor to initialize required parameters for calculating area. ***You might have to use dummy argument in your base class overloaded constructors.***
- In main, Create objects of derived classes rectangle, triangle and circle, cylinder. Create a pointer of base class "area". With this pointer, point to the objects of derived classes one by one and calculate area of each individual shape. (Give call to both area functions of each class and explain in comments each type (overloaded or overridden) of area function during calling)