

# Lab 3 – Inheritance

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## Lab Task:

1. Create an Address class, which contains street#, house#, city and code (all of type String). Create another class Person that contains an address of type Address. Give appropriate get and set functions for both classes. Test class person in main.
2. Write the program, which has two classes one, is Date having members (day, month, year) and the other class is called Employee. The employee has Date class as member as each employee has Date of joining, Date of Birth etc.
  - a. Determine if an employee joined the organization within last five years if the current year is 2012.
  - b. Determine if an Employee has age less than 40 years?
3. Imagine a publishing company that markets both book and audio-cassette versions of its works. Create a class publication that stores the *title* and *price* of a publication.
  - a) From this class derive two classes:
    - i) book, which adds a *page count* and
    - ii) tape, which adds a *playing time* in minutes.
    - iii) each of these three classes should have *getdata()* function to get its data from the user at the keyboard and a *putdata()* function to display its data.
  - b) Write a main() program to test the book and tape class by creating instances of them, asking the user to fill in their data with *getdata()* and then displaying the data with *putdata()*.
4. Write a class Person that has attributes of *id*, *name* and *address*. It has a constructor to initialize, a member function to input and a member function to display data members. Create another class Student that inherits Person class. It has additional attributes of *rollnumber* and *marks*. It also has member function to input and display its data members.
5. Write a base class Computer that contains data members of *wordsize(in bits)*, *memorysize (in megabytes)*, *storagesize (in megabytes)* and *speed (in megahertz)*. Derive a Laptop class that is a kind of computer but also specifies the object's length, width, height, and weight. Member functions for both classes should include a default constructor, a constructor to initialize all components and a function to display data members.

## Home Tasks

1. Write a program having a base class Student with data members *rollno*, *name* and Class define a member functions *getdata()* to input values and another function *putdata()* to display all values. A class Test is derived from class Student with data members *T1marks*, *T2marks*, *T3marks*, *Sessional1*, *Sessional2*, *Assignment* and *Final*. Also make a function *getmarks()* to enter marks for all variables except Final and also make a function *putmarks()* to display

result. Make a function *Finalresult()* to calculate value for final variable using other marks. Then display the student result along with student data.

2. Write a program that declares two classes. The parent class is called *Simple* that has two data members *num1* and *num2* to store two numbers. It also has four member functions.

- The *add()* function adds two numbers and displays the result.
- The *sub()* function subtracts two numbers and displays the result.
- The *mul()* function multiplies two numbers and displays the result.
- The *div()* function divides two numbers and displays the result.

The child class is called *Complex* that overrides all four functions. Each function in the child class checks the value of data members. It calls the corresponding member function in the parent class if the values are greater than 0. Otherwise it displays error message.

3. An electricity board charges the following rates to domestic users to discourage large consumption of energy.

- For the first 100 units – 50 P per unit
- Beyond 100 units – 60 P per unit

If the total *cost* is more than Rs.250.00 then an additional surcharge of 15% is added on the difference. Define a class *Electricity* in which the function *Bill* computes the *cost*. Define a derived class *More\_Electricity* and override *Bill* to add the *surcharge*.

4. (Package Inheritance Hierarchy) Package-delivery services, such as FedEx®, DHL® and UPS®, offer a number of different shipping options, each with specific costs associated. Create an inheritance hierarchy to represent various types of packages. Use *Package* as the base class of the hierarchy, then include classes *TwoDayPackage* and *OvernightPackage* that derive from *Package*. Base class *Package* should include data members representing the *name*, *address*, *city*, *state* and *ZIP code* for both the sender and the recipient of the package, in addition to data members that store the *weight* (in ounces) and *cost per ounce* to ship the package. *Package*'s constructor should initialize these data members. Ensure that the *weight* and *cost per ounce* contain positive values. *Package* should provide a public member function *calculateCost()* that returns a double indicating the cost associated with shipping the package. *Package*'s *calculateCost()* function should determine the cost by multiplying the *weight* by the *cost per ounce*. Derived class *TwoDayPackage* should inherit the functionality of base class *Package*, but also include a data member that represents a *flat fee* that the shipping company charges for two-day-delivery service. *TwoDayPackage*'s constructor should receive a value to initialize this data member. *TwoDayPackage* should redefine member function *calculateCost()* so that it computes the *shipping cost* by adding the *flat fee* to the *weight-based cost* calculated by base class *Package*'s *calculateCost()* function. Class *OvernightPackage* should inherit directly from class *Package* and contain an additional data member representing an additional fee per ounce charged for overnight-delivery service. *OvernightPackage* should redefine member function *calculateCost()* so that it adds the additional *fee per ounce* to the standard *cost per ounce* before calculating the *shipping cost*. Write a test program that creates objects of each type of *Package* and tests member function *calculateCost()*.