This document contains information about labolatory exercises.

Object-oriented programming classes 2

Subject - Differences C/C++, inheritance, polymorphism

1. Inheritance

1. Download file *person.cpp*.
   a) Using basic UML notation draw simple class diagram of classes from given file.
   b) Create new class Student, which inherits from class Person. We call Student as derived or child class. Student should extend class Person by adding new attribute *scholarship* and methods (*float getScholarship*() i *void setScholarship*(*float*)).
   c) Override method *string getSecondName*() in class Student in such a way that it will add little "s" in the front of second name.
   d) Add default constructor and arguments constructor that set all information about Student (see constructors in class Person).
   e) Create new class Worker, which inherits from class Person. Define two constructors, analogous to class Student. Worker should extend class Person by adding new attribute *salary*, and methods that encapsulate this attribute (*float getSalary*(), *void setSalary*()). Define also method *float getBonus*(), which calculate bonus salary for worker (let bonus be equal 20 percent of his monthly salary).
   f) In class Worker and Student define method *float income*(). Worker income should be equal his monthly salary plus bonus reduce by tax (22%). Student income should be equal his scholarship plus constant bank interest rate(6%).
   g) Create class WorkingStudent, which inherits from both Student and Worker class. Income of WorkingStudent should be equal sum of work salary and the scholarship. Update your UML class diagram.

2. Polymorphism

1. Base on classes Person, Student and Worker write function which calculate sum of incomes of all people at university.
   a) Start form defining virtual method *float income*() in parent class Person.
   b) Create global function *profit*() which calculate sum of incomes of all people at university (remember them in global table *Person* * *people*[10]).

c) Change type of people from *Person∗* to *Person*. Is polymorphism mechanism still working ? Check the same when you erase word virtual before declaration of method *float income*() in Person class ?

3. Do it yourself tasks

1. Create new class PhdStudent which inherits class Student. PhdStudent should extend class Person by adding new attribute year which point his year of study.

2. For every class defined add new attribute *pocket* which will remember amount of money that given object posses, also add new method *void payment*(*float amount*) that add to given object pocket amount of money equal to his monthly income. Simulate how much money each person will have after a year, assuming that scholarship for students is paid only through 9 months of the year, phd students gets their stipends 12 months in year and worker besides regular 12 salaries get also once in year the 13th payment. At the end of program print all information about every object in the system (first, second name, amount of money in the pocket and year of study if it is set).