1. **Hierarchical Inheritance**. Figure 1 represents the structure of this inheritance. Implement a base class **employee** with two private properties **char name[80]** and **unsigned long number**. Furthermore class **employee** contains two public methods **getdata** and **putdata**. Method **getdata** asks **name** and **number**. Method **putdata** prints **name** and **number**. The derived class **manager** contains properties **char title[80]** and **double dues**. Furthermore the class **manager** contains two public methods **getdata** and **putdata**. The method **getdata** referes the **getdata** of base class **employee**. Furthermore the method **getdata** asks **title** and **dues**. The method **putdata** referes the **putdata** of base class **employee**. Furthermore the method **putdata** prints **title** and **dues**. The derived class **scientist** contains property **int pubs**. Furthermore the class **scientist** contains two public methods **getdata** and **putdata**. The method **getdata** referes the **getdata** of base class **employee**. Furthermore the method **getdata** asks **pubs**. The method **putdata** referes the **putdata** of base class **employee**. The method **putdata** also prints **pubs**. The derived class **scientist** contains property **int pubs**. Furthermore the class **scientist** contains two public methods **getdata** and **putdata**. The method **getdata** referes the **getdata** of base class **employee**. Furthermore the method **getdata** asks **pubs**. The method **putdata** referes the **putdata** of base class **employee**. The method **putdata** also prints **pubs**. The derived class **laborer** contains no code (is empty). It contains only braces ({}). In main function you have to define two managers, one scientists and one laborer. Input and output must be like in figure 2.

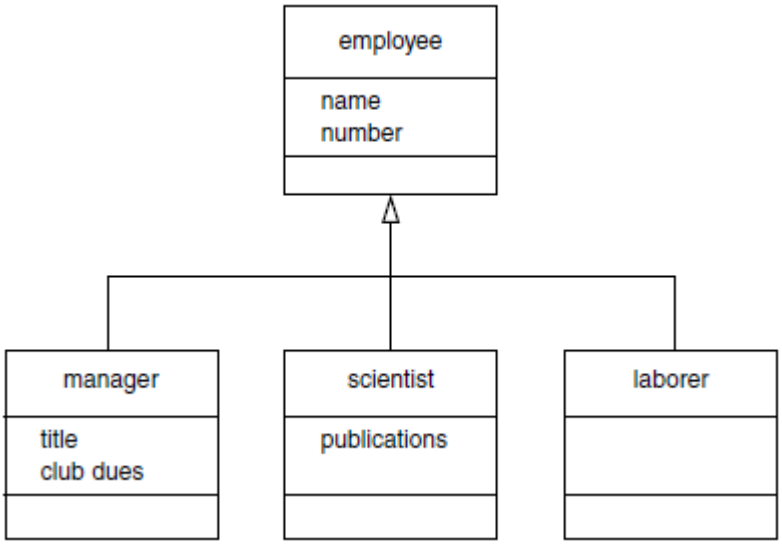

Figure 1. Stucture of inheritance

< continued >

```
Enter data for manager 1
   Enter last name: Wainsworth
   Enter number: 10
   Enter title: President

    Enter golf club dues: 1000000
 Enter data on manager 2
    Enter last name: Bradley
    Enter number: 124
    Enter title: Vice-President
    Enter golf club dues: 500000
 Enter data for scientist 1
    Enter last name: Hauptman-Frenglish
    Enter number: 234234
    Enter number of pubs: 999
 Enter data for laborer 1
    Enter last name: Jones
    Enter number: 6546544
```

The program then plays it back.

```
 Data on manager 1
    Name: Wainsworth
    Number: 10
    Title: President
    Golf club dues: 1000000
 Data on manager 2
    Name: Bradley
    Number: 124
    Title: Vice-President
    Golf club dues: 500000
 Data on scientist 1
     Name: Hauptman-Frenglish
    Number: 234234
    Number of publications: 999
 Data on laborer 1
    Name: Jones
    Number: 6546544
```

Figure 2. Sample print in Dev C++ -program

< continued >

2. **Multiple inheritance**. Figure 3 represents the structure of this inheritance. Implement a base class **student** with private properties **char school[80]** and **char degree[80]**. Furthermore class **student** contains two public methods **getedu** and **putedu**. Method **getedu** asks **school** and **degree**. Method **putedu** prints **school** and **degree**. Another base class **employee** contains private properties **char name[80]** and **unsigned long number**. Furthermore class **employee** contains two public methods **getdata** and **putdata**. Method **getdata** asks **name** and **number**. Method **putdata** prints **name** and **number**. The derived class **manager** contains properties **char title[80]** and **double dues**. Furthermore the class **manager** contains two public methods **getdata** and **putdata**. The method **getdata** uses the **getdata** of base class **employee** and **getedu** of base class **student**. Furthermore the method **getdata** asks **title** and **dues**. The method **putdata** uses the **putdata** of base class **employee** and **putedu** of base class **student**. Furthermore the method **putdata** prints **title** and **dues**. The derived class **scientist** contains property **int pubs**. Furthermore the class **scientist** contains two public methods **getdata** and **putdata**. The method **getdata** uses the **getdata** of base class **employee** and the **getedu** of base class **student**. Furthermore the method **getdata** asks **pubs**. The method **putdata** uses the **putdata** of base class **employee** and the **putedu** of base class **student**. The derived class **laborer** contains no code (is empty). It contains only braces ({}). In main function you have to define one manager, two scientists and one laborer. Input and output must be like in figure 4.

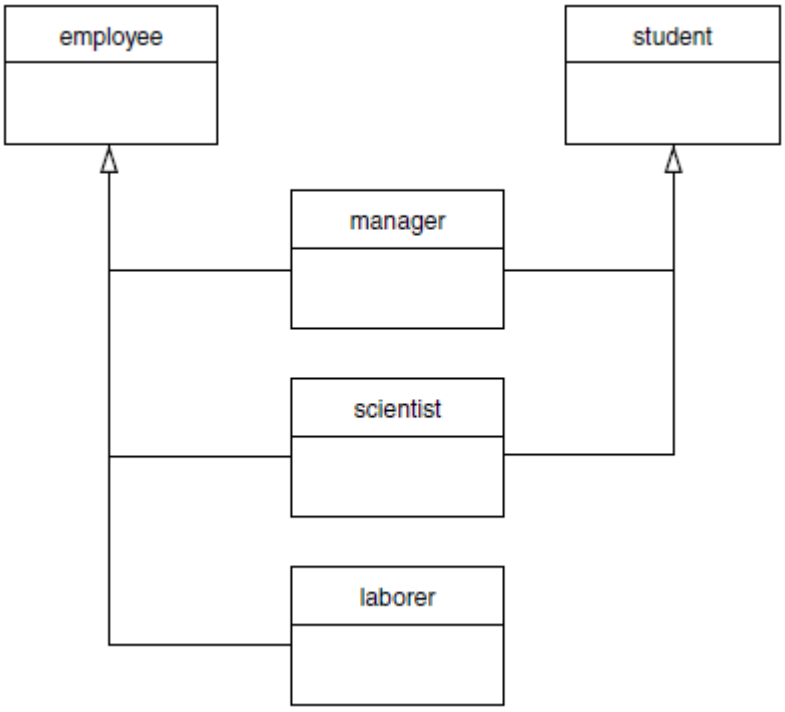

Figure 3. Stucture of inheritance

< continued >

```
Enter data for manager 1
   Enter last name: Bradley
   Enter number: 12
   Enter title: Vice-President
   Enter golf club dues: 100000
   Enter name of school or university: Yale
   Enter highest degree earned
   (Highschool, Bachelor's, Master's, PhD): Bachelor's

Enter data for scientist 1
   Enter last name: Twilling
   Enter number: 764
   Enter number of pubs: 99
   Enter name of school or university: MIT
   Enter highest degree earned
   (Highschool, Bachelor's, Master's, PhD): PhD

Enter data for scientist 2
   Enter last name: Yang
   Enter number: 845
   Enter number of pubs: 101
   Enter name of school or university: Stanford
   Enter highest degree earned
   (Highschool, Bachelor's, Master's, PhD): Master's

Enter data for laborer 1
   Enter last name: Jones
   Enter number: 48323
```

Figure 4. Sample print in Dev C++ -program

< continued >

3. **Multiple inheritance**. Figure 5 represents the structure of this inheritance. Implement a base class **Area** with no properties and one two parametric method **area_calc** which returns the area. Implement also base class **Perimeter** with no properties and one two parametric method **peri_calc** which returns the perimeter. Furthermore implement class **Rectangle** with two properties **length** and **breadth**. This class contains one method **get_data** which requests values of properties **length** and **breadth**. The class **Rectangle** contains also methods **area_calc** and **peri_calc**. The method **area_calc** uses **area_calc** of class **Area**. The method **peri_calc** uses **peri_calc** of class **Perimeter**. In main function you have to define one **Rectangle** object and then one call of method **get_data**. Input and output must be like in figure 6.

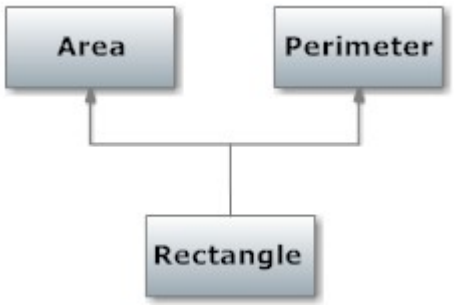

Figure 5. Stucture of inheritance

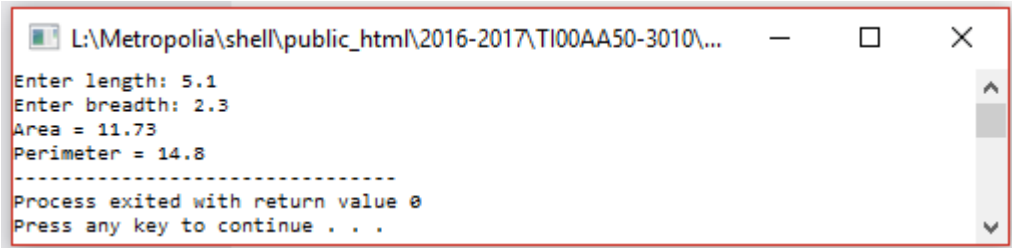

Figure 6. Sample print in Dev C++ -program

< continued >

4. **Multiple inheritance**. In figure 7 is inheritance hierarchy of shape classes. Plan and implement classes as good as possible. Implement a main function where you define one rectangle, square, triangle, ellipse and circle object. You have to print areas of each of them.

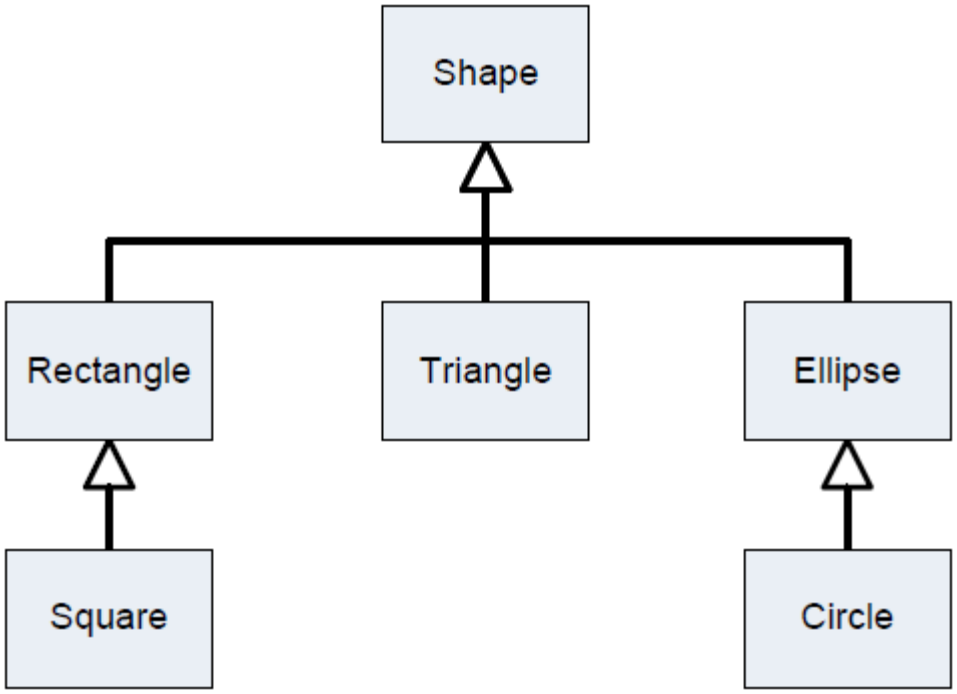

Figure 7. Inheritance hierarchy of shape classes