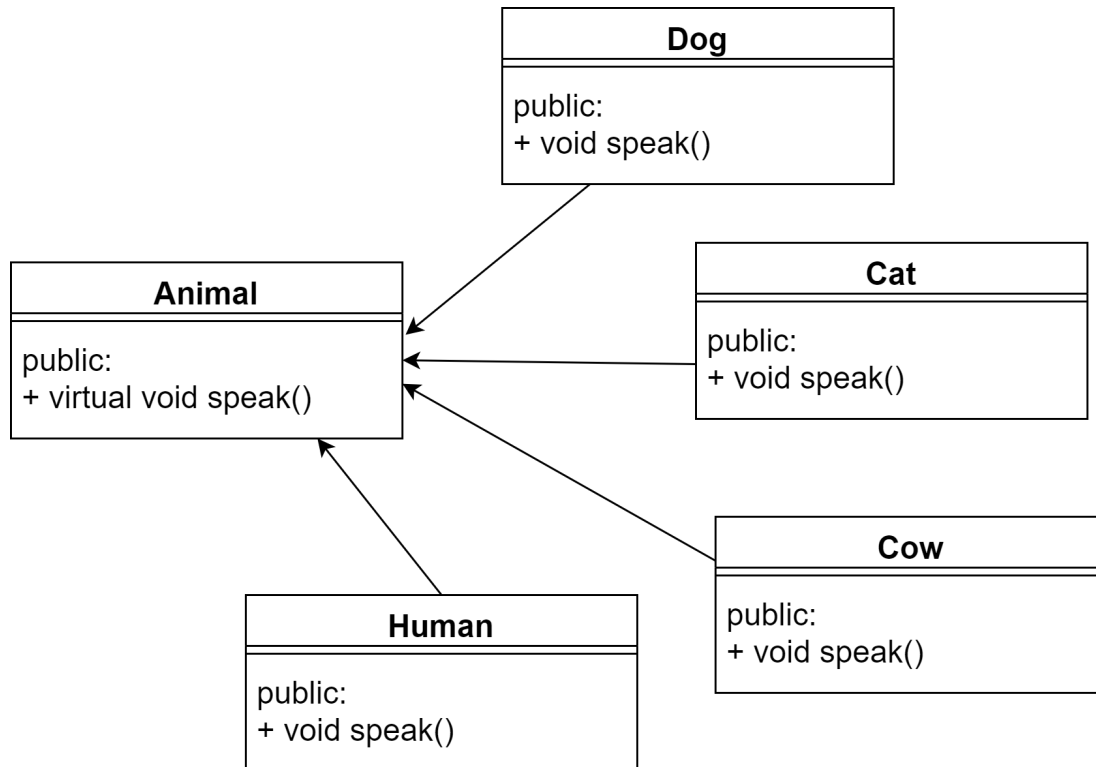


## Homework 3: Inheritance in C++

**Task 1:** Given following UML design:

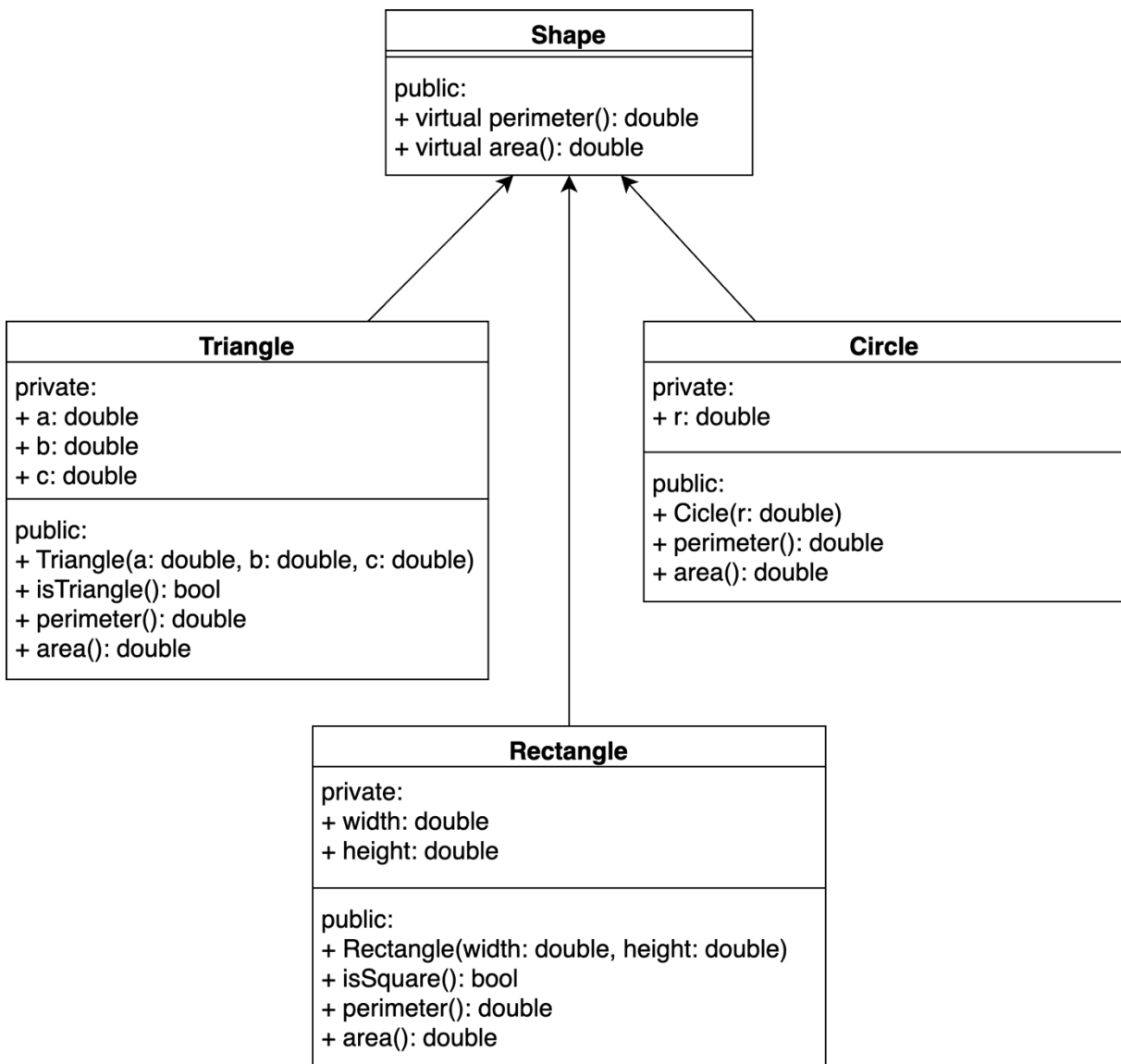


- Class **Dog**, **Cat**, **Cow** and **Human** inherit **Animal** class.
- Functions will print out the sound from that animal.
- Use the below main function to check your classes:

```
#include <iostream>
using namespace std;

int main() {
    Animal animal;
    animal->speak();
    Dog dog;
    dog->speak();
    Cat cat;
    cat->speak();
    Cow cow;
    cow->speak();
    Human human;
    human->speak();
    return 0;
}
```

**Task 2:** Create classes with the following UML design:



Explanation:

- Class **Triangle**, **Rectangle** and **Circle** inherit **Shape** class.
- In **Triangle** class, a, b and c are the 3 sides of the triangle, respectively.
- **isTriangle()** return **true** if a, b and c form a triangle, otherwise return **false**.
- **perimeter()** in **Triangle** class returns perimeter of that triangle if a, b and c form as triangle, if not, output a message: "This is not a triangle".
- **area()** in **Triangle** class returns area of that triangle if a, b and c form as triangle, if not, output a message: "This is not a triangle".
- **isSquare()** return **true** if the width and height are equal, otherwise return **false**.
- **perimeter()** in **Rectangle** class returns perimeter of that rectangle.
- **area()** in **Rectangle** class returns area of that rectangle.

Write a main function to create 3 instances of each class by using constructor and output the perimeter and area of each shape.

```
include <iostream>
using namespace std;

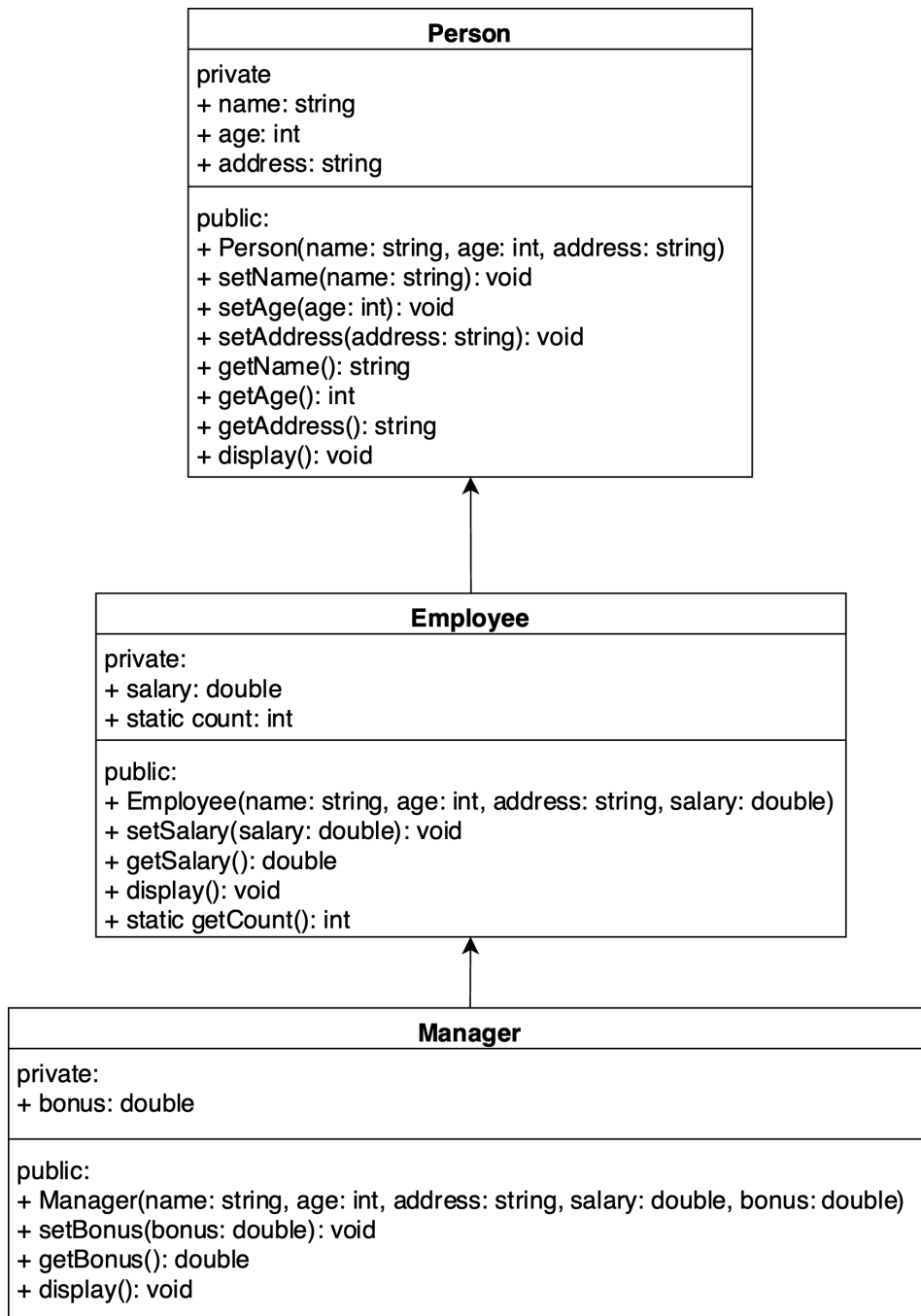
int main() {
    // Examine Triangle class
    Triangle tri(3,4,5);
    if (tri.isTriangle()) {
        cout << "This is a triangle" endl;
        cout << "Perimeter: " << tri.perimeter() < end;
        cout << "Area:" << tri.area() << endl;
    }
    else {
        cout << "This is not a triangle" << endl;
    }

    // Examine Rectangle class
    Rectangle rec(8,8);
    if (tri.isSquare()) {
        cout << "This is a square" << endl;
    }
    else {
        cout << "This is not a square" << endl;
    }
    cout << "Perimeter: " << rec.perimeter() < end;
    cout << "Area:" << rec.area() << endl;

    // Examine Circle class
    Circle cir(2.4);
    cout << "Perimeter: " << cir.perimeter() < end;
    cout << "Area:" << cir.area() << endl;

    return 0;
}
```

**Task 3:** Create classes with the following design:



Explanation:

- **Person** class stores the information of a person and a **count** as a **static member**.
- **getCount()** function member will return number of employees created.
- In **Manager** class, bonus data member stores the percentage of salary that manager can be received.
- The salary of a manager will be calculated by **salary + bonus\*salary**.

Write a main function to create 3 employees and 1 manager using constructor and output the information and salary of each person.

```
include <iostream>
using namespace std;

int main() {
    // Examine Employee class
    Employee em1("Lin Jia-Hui",24,"23, Da-an", 38000);
    Employee em2("Lee Zhe-Wei",22,"12, Lin Shen street", 42000);
    Employee em3("Chen Zheng",28,"2, Xinyi Street", 41000);

    em1.display();
    em2.display();
    em2.display();

    Manager ma1("Huang Shen",32,"23 Yuan Dong street", 46000, 0.3);
    ma1.display();

    return 0;
}
```