Exercises: Polymorphism

This document defines the exercises for ["Java OOP Basics" course @ Software University](). Please submit your solutions (source code) of all below described problems in [https://judge.softuni.bg/Contests/242/Polymorphism-Exercises]() .

Problem 1. Vehicles

Write a program that models 2 vehicles (**Car** and **Truck**) and will be able to simulate **driving** and **refueling** them. **Car** and **truck** both have **fuel quantity**, **fuel consumption in liters per km** and can be **driven given distance** and **refueled with given liters.** But in the summer both vehicles use air conditioner and their **fuel consumption** per km is **increased** by **0.9** liters for the **car** and with **1.6** liters for the **truck**. Also the **truck** has a tiny hole in his tank and when it gets **refueled** it gets only **95%** of given **fuel**. The **car** has no problems when refueling and adds **all given fuel to its tank.** If vehicle **cannot** travel given distance its fuel does not change.

Input

- On the **first line** - information about the car in format **`{Car {fuel quantity} {liters per km}}`**
- On the **second line** – info about the truck in format **`{Truck {fuel quantity} {liters per km}}`**
- On third line - **number of commands N** that will be given on the next **N** lines
- On the next **N** lines – commands in format
  - **`Drive Car {distance}`**
  - **`Drive Truck {distance}`**
  - **`Refuel Car {liters}`**
  - **`Refuel Truck {liters}`**

Output

After each **Drive command** print whether the Car/Truck was able to travel given distance in format if it's successful. **Print the distance with all digits after the decimal separator except trailing zeros.** Use the **DecimalFormat** class:

```
Car/Truck travelled {distance} km
```

Or if it is not:

```
Car/Truck needs refueling
```

Finally print the **remaining fuel** for both car and truck rounded **2 digits after floating point** in format:

```
Car: {liters}
Truck: {liters}
```

Example

Input	Output
Car 15 0.3 Truck 100 0.9 4 Drive Car 9 Drive Car 30 Refuel Car 50 Drive Truck 10	Car travelled 9 km Car needs refueling Truck travelled 10 km Car: 54.20 Truck: 75.00

`Car 30.4 0.4`	`Car needs refueling`
`Truck 99.34 0.9`	`Car travelled 13.5 km`
`5`	`Truck needs refueling`
`Drive Car 500`	`Car: 113.05`
`Drive Car 13.5`	`Truck: 109.13`
`Refuel Truck 10.300`	
`Drive Truck 56.2`	
`Refuel Car 100.2`	

Problem 2. Vehicles Extension

Use your solution of the previous task for starting point and add more functionality. Add new vehicle – **Bus**. Now every vehicle has **tank capacity** and fuel quantity **cannot fall below 0** (If fuel quantity become less than 0 **print** on the console **"Fuel must be a positive number"**).

The **car** and the **bus cannot be filled** with fuel **more than their tank capacity**. If you **try to put more fuel** in the tank than the **available space,** print on the console **"Cannot fit fuel in tank"** and **do not add any fuel** in vehicles tank.

Add **new command** for the bus. The **bus** can **drive with or without people**. If the bus is driving **with people**, the **air-conditioner is turned on** and its **fuel consumption** per kilometer is **increased with 1.4 liters**. If there are **no people in the bus** when driving the air-conditioner is **turned off** and **does not increase** the fuel consumption.

Input

- On the first three lines you will receive information about the vehicles in format:
  `Vehicle {initial fuel quantity} {liters per km} {tank capacity}`
- On fourth line - **number of commands N** that will be given on the next **N** lines
- On the next **N** lines – commands in format
  - **`Drive Car {distance}`**
  - **`Drive Truck {distance}`**
  - **`Drive Bus {distance}`**
  - **`DriveEmpty Bus {distance}`**
  - **`Refuel Car {liters}`**
  - **`Refuel Truck {liters}`**
  - **`Refuel Bus {liters}`**

Output

- After each **Drive command** print whether the Car/Truck was able to travel given distance in format if it's successful:

```
Car/Truck/Bus travelled {distance} km
```

- Or if it is not:

```
Car/Truck/Bus needs refueling
```

- If given fuel is **≤ 0** print **"Fuel must be a positive number".**
- If given fuel cannot fit in car or bus tank print **"Cannot fit in tank"**
- Finally print the **remaining fuel** for both car and truck rounded **2 digits after floating point** in format:

```
Car: {liters}
Truck: {liters}
Bus: {liters}
```

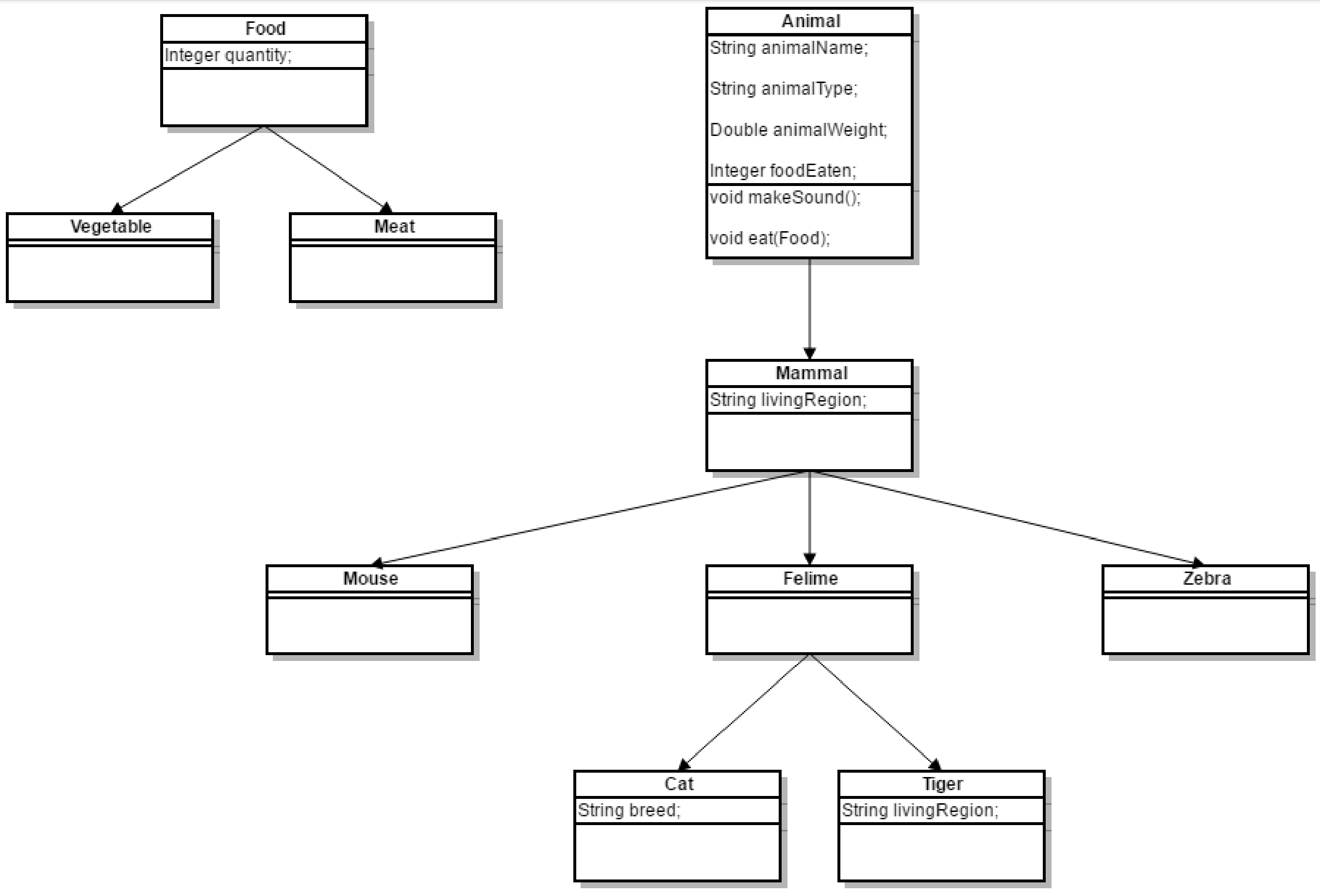
Example

Input	Output

`Car 30 0.04 70`
`Truck 100 0.5 300`
`Bus 40 0.3 150`
`8`
`Refuel Car -10`
`Refuel Truck 0`
`Refuel Car 10`
`Refuel Car 300`
`Drive Bus 10`
`Refuel Bus 1000`
`DriveEmpty Bus 100`
`Refuel Truck 1000`
	`Fuel must be a positive number`
	`Fuel must be a positive number`
	`Cannot fit fuel in tank`
	`Bus travelled 10 km`
	`Cannot fit fuel in tank`
	`Bus needs refueling`
	`Car: 40.00`
	`Truck: 1050.00`
	`Bus: 37.00`

Problem 3. Wild farm

Your task is to create a class **hierarchy** like the picture below. All the classes except **Vegetable**, **Meat**, **Mouse**, **Tiger**, **Cat** & **Zebra** should be **abstract**.



Input should be read from the console. Every **even** line will contain information about the Animal in following format:

{AnimalType} {AnimalName} {AnimalWeight} {AnimalLivingRegion} [{CatBreed} = *Only if its cat*]

On the **odd** lines you will receive information about the food that you should give to the Animal. The line will consist of **FoodType** and **quantity** separated by a whitespace.

You should build the logic to determine if the animal is going to eat the provided food. The Mouse and Zebra should check if the food is a Vegetable. If it is they will eat it. Otherwise you should print a message in the format:

{AnimalType} are not eating that type of food!

Cats eat **any** kind of food, but **Tigers** accept **only Meat**. If **Vegetable** is provided to a **tiger** message like the one above should be printed on the console.

After you read information about the Animal and Food then invoke **makeSound()** method of the current animal and then feed it. At the end print the whole object and proceed reading information about the next animal/food. The input will continue until you receive "**End**". After that print the information of all received animals in format:

{AnimalType} [{AnimalName}, {CatBreed}, {AnimalWeight}, {AnimalLivingRegion}, {FoodEaten}]

Print all **AnimalWeight** with no trailing zeroes after the decimal separator. Use the **DecimalFormat** class.

Note: consider overriding toString() method.

Input	Output

`Cat Gray 1.1 Home Persian`
`Vegetable 4`
`End`
	Meowwww
	Cat[Gray, Persian, 1.1, Home, 4]

`Tiger Typcho 167.7 Asia`
`Vegetable 1`
`End`
	ROAAR!!!
	Tigers are not eating that type of food!
	Tiger[Typcho, 167.7, Asia, 0]

`Zebra Doncho 500 Africa`
`Vegetable 150`
`End`
	Zs
	Zebra[Doncho, 500, Africa, 150]

`Mouse Jerry 0.5 Anywhere`
`Vegetable 0`
`End`
	SQUEEEAAAK!
	Mouse[Jerry, 0.5, Anywhere, 0]