

# Object-Oriented Programming – Exercises Week 6

This week the goal is to practice inheritance and type castings.

## The learning goal for the exercises

1. Using inheritance in program code
2. Using type conversions

## Exercise 1 – Creating vehicles

Your assignment is to create classes called Vehicle, Car, Plane, Ship and Engine. These class names are mandatory and cannot be changed. All forms of transportation (Car, Plane and Ship) have their own engine object. The engine information consists of name and power. For car, these are “V8” and 300. For plane, these are “Jet engine” and 500. For ship, these are “Wärtsilä Super” and 1000.

The constructor of Vehicle takes the following parameters in this order: String type, String manufacturer, String model, int maxSpeed. Car, Plane and Ship takes the following parameters: String manufacturer, String model, int maxSpeed.

## 1 point implementation

**Feature 1:** The Car, Plane and Ship are inherited from Vehicle class.

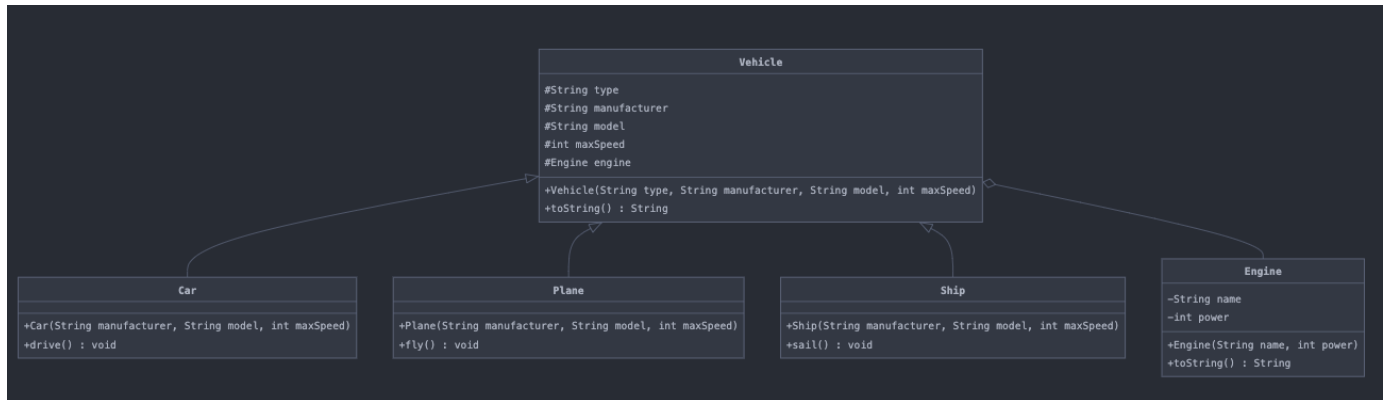
**Feature 2:** Each subclass has their own method: drive() for the Car class, fly() for the Plane class and sail() for the Ship class.

## 2 point implementation

**Feature 3:** The program has the functionality to create new cars, planes and ships. The information can be printed out and shown to the user. The information of different vehicles can be saved in ArrayList<Vehicle> data structure.

**Feature 4:** The program can make the created objects to move. User can make all the cars to drive, all planes to fly and all ships to sail. Utilize the **instanceof** operator and type conversion to make the correct objects move.

# Class Diagram



## Example run

1) Create new vehicle, 2) List vehicles 3) Drive cars, 4) Fly planes, 5) Sail the ships, 0) End the program

1

Which vehicle do you want to build? 1) car, 2) plane, 3) ship

1

Who is the manufacturer?

Volvo

What is the model of the vehicle?

240

What is the top speed?

180

1) Create new vehicle, 2) List vehicles 3) Drive cars, 4) Fly planes, 5) Sail the ships, 0) End the program

1

Which vehicle do you want to build? 1) car, 2) plane, 3) ship

1

Who is the manufacturer?

Lada

What is the model of the vehicle?

2105

What is the top speed?

160

1) Create new vehicle, 2) List vehicles 3) Drive cars, 4) Fly planes, 5) Sail the ships, 0) End the program

1

Which vehicle do you want to build? 1) car, 2) plane, 3) ship

3

Who is the manufacturer?

Rauman telakka

What is the model of the vehicle?

Oasis of the seas

What is the top speed?

40

1) Create new vehicle, 2) List vehicles 3) Drive cars, 4) Fly planes, 5) Sail the ships, 0) End the program

1

Which vehicle do you want to build? 1) car, 2) plane, 3) ship

2

Who is the manufacturer?

Airbus

What is the model of the vehicle?

727

What is the top speed?

800

1) Create new vehicle, 2) List vehicles 3) Drive cars, 4) Fly planes, 5) Sail the ships, 0) End the program

2

Car: Volvo 240

Max Speed: 180 km/h

Engine: V8 (300 HP)

Car: Lada 2105

Max Speed: 160 km/h

Engine: V8 (300 HP)

Ship: Rauman telakka Oasis of the seas

Max Speed: 40 km/h

Engine: Wärtsilä Super (1000 HP)

Plane: Airbus 727

Max Speed: 800 km/h

Engine: Jet engine (500 HP)

1) Create new vehicle, 2) List vehicles 3) Drive cars, 4) Fly planes, 5) Sail the ships, 0) End the program

3

Volvo 240 is driving on the road!

Lada 2105 is driving on the road!

1) Create new vehicle, 2) List vehicles 3) Drive cars, 4) Fly planes, 5) Sail the ships, 0) End the program

4

Airbus 727 is flying in the sky!

1) Create new vehicle, 2) List vehicles 3) Drive cars, 4) Fly planes, 5) Sail the ships, 0) End the program

5

Rauman telakka Oasis of the seas is sailing on the sea!

1) Create new vehicle, 2) List vehicles 3) Drive cars, 4) Fly planes, 5) Sail the ships, 0) End the program

0

Thank you for using the program.