Università della Svizzera italiana **Advanced Java Programming**
Assignment 2 **Fall 2022**
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Instructions

- This assignment consists of 40 points and counts 4% towards your overall grade.
- The deadline of the assignment will be published on iCorsi. The deadline is strict.
- You are supposed to submit a single zip file. The zip should contain both textual and code solutions. Textual solutions should be included in a single PDF. All pages of the PDF must have your name in the upper right corner. Code solutions must consist of source code (no JARs or compiled classes). Use the following pattern for naming your submission files: $< firstname > . < lastname > .zip$.
- The assignment considers (vanilla) Java version 17. For simplicity, code snippets may not always contain the full code (e.g., imports or called methods might be omitted). If not mentioned otherwise, you can assume that the snippets compile, the hidden code is implemented correctly, and methods do what their name suggests, without throwing any runtime exceptions.
- You will not receive full points for solutions which produce the correct result but don't follow fundamental programming best practices or documented contracts. Further, don't consider any solutions that involve the use of Java reflection.

Exercise A: Get-Put Principle (3 Points)

Please answer the questions below and provide a short and precise explanation.
Consider the following code snippet:

```
1 public static <T> void copy(List<? super T> src,
2                     List<? extends T> dst)  {
3     int index = 0;
4     for (T elem : src) {
5         dst.set(index, elem);
6         index++;
7     }
8 }
```

1. Will the above code snippet trigger some compile-time warnings or errors?
2. If the code compiles, will it throw some runtime exceptions?

Exercise B: Generic Array (3 Points)

Please answer the questions below and provide a short and precise explanation. Consider the following code snippet:

```
1  public class MyArrayGenerator {
2      public static <T> T[] myArrayGenerator(int size) {
3          T[] myarray = (T[]) new Object[size];
4          return myarray;
5      }
6
7      public static void main(String[] args) {
8          String[] elem = myArrayGenerator(10);
9      }
10 }
```

1. Will the above code snippet trigger some compile-time warnings or errors?
2. If the code compiles, will it throw some runtime exceptions?

Exercise C: Singleton (3 Points)

Please answer the questions below and provide a short and precise explanation. Consider the following code snippet:

```
1  public class Singleton<T> {
2
3      private static T instance;
4
5      public static T getInstance() {
6          if (instance == null)
7              instance = new Singleton<T>();
8
9          return instance;
10     }
11 }
```

1. Will the above code snippet trigger some compile-time warnings or errors?
2. If the code compiles, will it throw some runtime exceptions?

Exercise D: Erasure (3 Points)

Please answer the questions below and provide a short and precise explanation.

```
1  public class Couple<T, U> {
2
3      public Class<?> getType(T t) {
4          return t.getClass();
5      }
6
7      public Class<?> getType(U u) {
8          return u.getClass();
9      }
10 }
```

1. Will the above code snippet trigger some compile-time warnings or errors?
2. If the code compiles, will it throw some runtime exceptions?

Exercise E: Overriding (3 Points)

Please answer the questions below and provide a short and precise explanation.

```
1  public class First {
2      void doSomething() {
3          System.out.println("I am a class");
4      }
5  }
6
7  public interface Second {
8      default void doSomething() {
9          System.out.println("I am an interface");
10     }
11 }
12
13 public class Third extends First implements Second {
14
15     @Override
16     public void doSomething() {
17         super.doSomething();
18     }
19
20     public static void main(String[] args) {
21         Third third = new Third();
22         third.doSomething();
23     }
24 }
```

1. What will be the outcome of the above code snippet?
2. What will happen if the method "doSomething" is removed from the class Third (deleting lines from 15 to 18)?

Exercise F: Coding (25 Points)

Please consider the code distributed with this assignment. You are expected to change the following classes (considering them in the following order may help you in solving the exercise):

1. ch.usi.inf.ajp22.flyable.Airplane.java
2. ch.usi.inf.ajp22.flyable.Wizard.java
3. ch.usi.inf.ajp22.flyable.FlyableComparator.java
4. ch.usi.inf.ajp22.flyable.PeopleComparator.java
5. ch.usi.inf.ajp22.Main.java

Please do not modify the comments in the sources files. Solution that do not compile will be awarded 0 points.

Your task: Follow the instruction in the TODO comments. Make use of Generics. Unless otherwise noted, make sure that the classes or methods that you are asked to implement/change are *as flexible as possible*.
Hints:

- Read very carefully the comments;
- Assume that every input parameter is not null;
- If anything is unclear, ask in the course forum on iCorsi;
- The project is build with maven, you can:
    1. compile it from scratch with the command:

        ```
        mvn compile
        ```

    2. import the project in an IDE (IntelliJ or Eclipse) and than execute it from there.